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STRUCTURE OF EPIGÆA REPENS.

By Edson S. Bastin.

The "first sweet smiles of May," as Whittier calls the flowers of this plant, prettily portray the fact that they are at once among the earliest and the most prized of our spring floral treasures.

In most localities where the plant is known it is called the Trailing Arbutus, but in Massachusetts and some other portions of New England it is commonly called the Mayflower, partly, perhaps, in allusion to its time of blossoming, and partly to the fact that it was the first flower to gladden the eyes of the Pilgrims in the spring after their first winter on the bleak shores of their new home.

The plant is widely distributed over the northeastern part of North America, but is especially abundant in the region of the Alleghenies and in the pine and fir-clad regions bordering the Great Lakes and the St. Lawrence River. It particularly affects rocky hill slopes, where the soil is light and well drained, but is not infrequently found on lower-lying sandy, tree-clad areas, where the soil is well aerated. The sturdy little plant also prefers the vigorous north, and is seldom found south of the line of the Ohio River, save in the more elevated portions of the Alleghenies. Its stems are prostrate, and the slender trailing branches often attain a foot in length, and possess, like the petioles and the under surfaces of the leaves, a copious growth of rusty-brown, multicellular, but simple hairs. These also occur, but much more sparingly, on the upper surface of the leaves. The leaves are evergreen, veiny, scarcely

coriaceous, deep green above, from 3 to 6 cm. long, elliptic in outline, ciliate-margined, cordate, or sometimes rounded at the base, cuspidate at the apex, exstipulate, but provided with petioles which are nearly as long as the leaf blades.

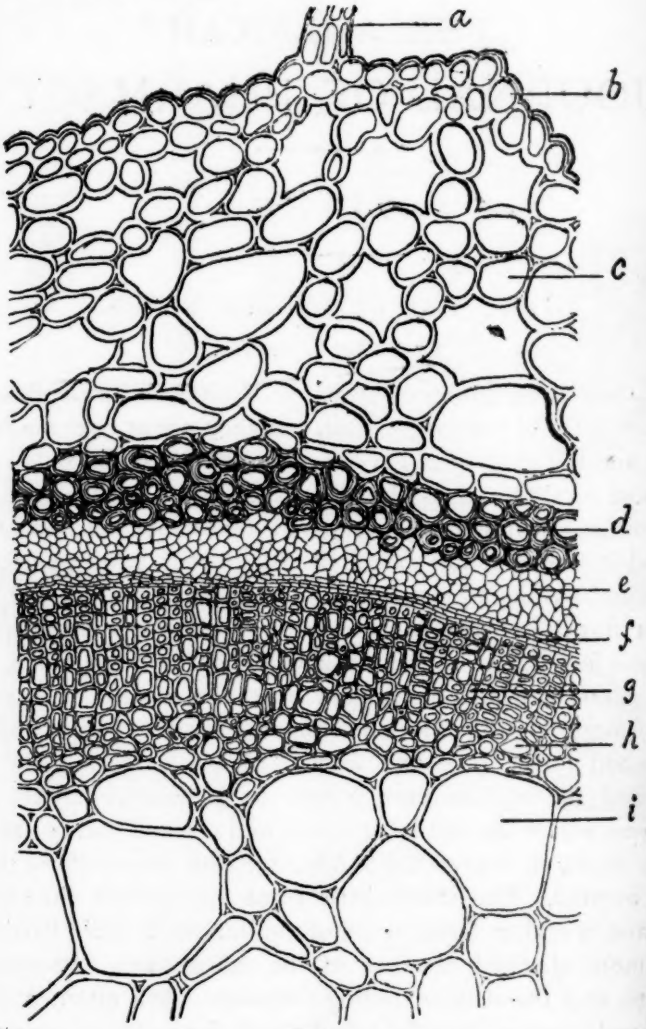

FIG. 1.

The fragrant flowers are arranged in short, almost spike-like racemes at the ends of the stems, and when they unfold in the spring are often quite concealed from view by dead leaves which

have fallen from the overhanging trees. The flowers are white or rose-tinged, and attain a length of 1½ or 2 cm. The pedicels are only two or three mm. long, and covered with rusty-brown hairs, as are also the scaly bracts which subtend the flowers. The calyx is deeply five-parted and the segments are erect, lanceolate, entire, nearly smooth, about the length of the corolla tube, pointed and scale-like. The corolla is hypogynous, salver-shaped, and the lobes of its five-parted limb are ovate, entire, obtuse or mucronate, and alternate with the segments of the calyx. The tube is hairy on its

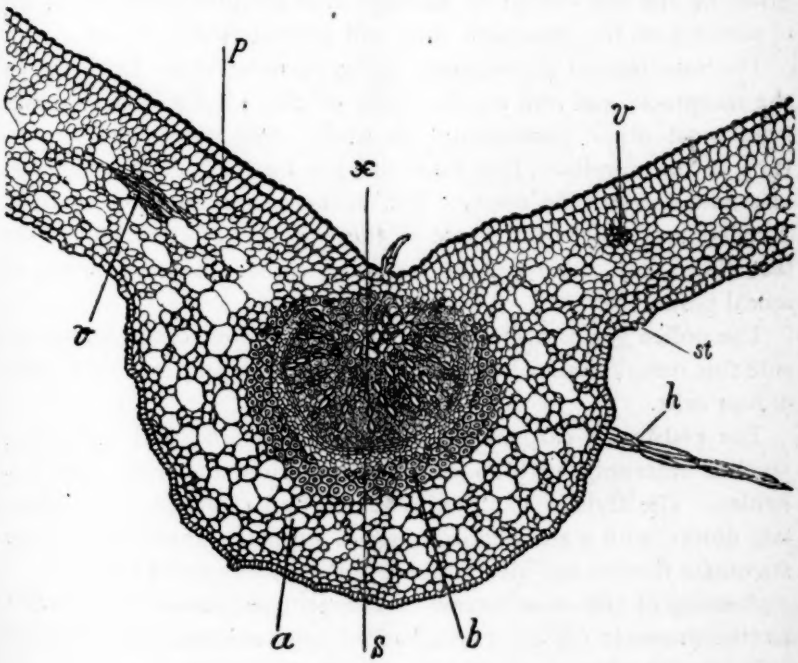

FIG. 2.

interior. The androecium consists of ten stamens, as in most other Ericaceæ, and they appear to be in but one whorl, though probably this is the result of a condensation from two.

The flowers, according to the investigations of Prof. W. P. Wilson, are really dicœcious, though most of them still possess both stamens and pistils. In the pistillate flowers, which are rose-colored, the stamens have sometimes completely disappeared, though in most instances they are still present, but functionless and smaller than they are in the staminate white flowers. The staminate flowers differ

from each other also, some having long stamens, others short ones, and still others those of intermediate length. There is a corresponding difference also in the length of the styles. The history of the flower, then, according to Prof. Wilson, is as follows: It was at first hermaphrodite, and the flowers of the species all had the same form. It then became dimorphous, later on trimorphous, and finally the stamens in some flowers and the pistils in others became abortive, as is the case with the species at the present time. It may therefore be safely predicted that in the process of evolution still going on the last vestige of stamens from the pistillate flowers, and of pistils from the staminate ones, will ultimately disappear.

The insertion of the stamens is, as in most other Ericaceæ, on the receptacle, and not on the tube of the corolla, differing thus from most other gamopetalæ, in which they are adnate to the tube of the corolla. The filaments are bearded at the base and alternate toward the apex. The anthers are introrse, versatile, 2-celled, and differ from those of the majority of the family in the fact that they dehisce longitudinally rather than by means of apical pores.

The pollen grains also differ from those of most other plants outside this natural order in the fact that each is composed of a group of four cells.

The pistil is 5-carpeled, the ovary faintly 10-lobed exteriorly, 5-celled interiorly, with an axile placentation and very numerous ovules. The style is erect, unbranching and crowned, in the pistillate flower, with a star-shaped, 5-rayed stigma. The stigmas of the staminate flowers are also 5-lobed, but the lobes never open.

A study of the cross-section of the stem shows such a structure as that drawn in *Fig. 2;* a small-celled epidermis, a loosely-arranged cortical parenchyma, whose cells vary greatly in size, a zone of well-developed bast-fibres in the outer phloem, a narrow zone of wood with a rather large pith composed of parenchyma cells, some of which are small or moderate in size, others relatively very large.

A cross-section of a leaf near its base shows the vascular area constituting the midrib to possess an outer crescent-shaped mass of bast-fibres, the horns of which are presented toward the upper surface of the leaf. Lining this is a thinner crescent of soft bast, which in turn includes a short, thick crescentic mass of xylem tissues. The latter shows a distinct radial arrangement of its elements, and these

rays focus upon a small area of parenchymatous tissues included between the horns of the inner crescent. This parenchyma, the xylem tissues, and the bast-fibres, in the mature leaf, are all strongly lignified. Exterior to the crescent-shaped area of bast-fibres is a region of loosely-arranged parenchyma enclosing the bundle, except on its upper side, and extending nearly to the epidermis below, and laterally to form the spongy parenchyma of the thin portions of the lamina. This parenchyma is quite similar in appearance to that composing the pith of the stem.

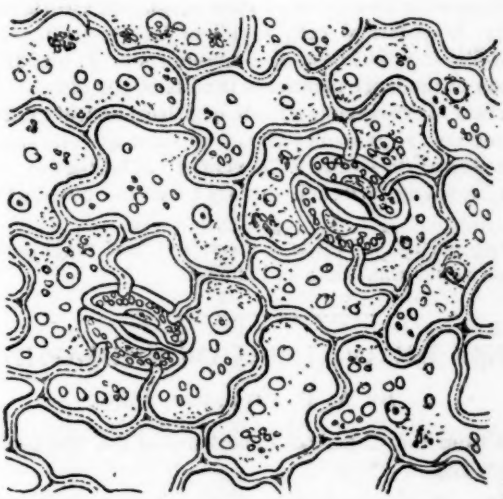

FIG. 3.

The epidermis is one-layered and rather small-celled, and the cells of the lower are smaller than those of the upper epidermis. The cuticle is thinner than that of most evergreen leaves. The rather compactly-arranged chlorophyll-bearing cells which face the upper epidermis differ from most palisade tissue in being but slightly lengthened. There are two or three layers of these cells.

The ordinary epidermal cells, in surface view, appear strongly wavy in outline, or lobed, and there is little difference of shape between those of the upper and those of the lower face of the leaf. Stomata occur also on both surfaces, but are more abundant on the lower.

DESCRIPTION OF FIGURES.

Frontispiece.—Trailing Arbutus.

A.—Flowering shoot about three-fourths natural size.

B.—Vertical section of a flower.

C.—Stamen, much enlarged.

D.—A pistil, also much enlarged.

E.—Pollen grains.

F.—Ground plan of flower.

G.—Enlarged view of cross-section of ovary, showing axile placentation.

[The above drawings are reproduced from the author's *Laboratory Exercists in Botany.*]

Fig. 1.—Portion of cross-section of stem magnified 230 diameters; *a*, base of one of the hairs; *b*, epidermal cell; *c*, cell of loosely-arranged cortical parenchyma; *d*, bast-fibres; *e*, soft bast; *f*, cambium zone; *g*, medullary ray; *h*, duct in xylem; *i*, one of the large parenchyma cells of the pith.

Fig. 2—Portion of cross-section made near base of leaf of Epigæa. Magnification 75 diameters; *p*, palisade tissue, composed of cells scarcely elongated; *h*, a hair; *st*, a stoma; *v*, section of a veinlet; *b*, bast-fibres; *s*, soft bast; *x*, duct in xylem; *a*, spongy parenchymatous tissue composed of large and small cells.

Fig. 3.—Small portion of lower epidermis of leaf magnified 560 diameters, showing ordinary epidermal cells and stomata.

SOME DERIVATIVES OF CHIMAPHILIN.

By W. E. Ridenour, Ph.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 139.

Chimaphilin is a crystalline, neutral principle, obtained from *Chimaphila umbellata*, Nuttall, and *Chimaphila maculata*, Pursh.

It was first described by Samuel Fairbanks (*Jour. and Trans. Md. College of Pharm.*, 1860, or American Journal of Pharmacy, 1860 p. 254), who obtained it by distilling the drug of the former species with water. E. S. Beshore (American Journal of Pharmacy, 1887, p. 125), was the next to investigate *Chimaphila umbellata*. He prepared chimaphilin by Fairbanks' process. He also extracted the dried drug with petroleum ether, and in the percolate found another crystalline principle, which melted at 236° C. Upon ultimate analysis he found its composition to be $C_{10}H_{19}O$. He believed it to be the active constituent of the drug.

In 1892, J. C. Peacock published in this Journal, p. 295, the account of an investigation of both species. He showed that

chimaphilin was obtainable from dry *Chimaphila maculata*, and, besides isolating it from both species by the method of Fairbanks, he extracted it by percolating the dried drug of the *C. umbellata* with petroleum ether. The crystals so obtained, after repeated crystallization, were found, by him, to melt between 113° and 114° C., and to have a composition represented by the formula $C_{24}H_{21}O_4$.

The same investigator also found three other crystalline principles, which were designated—according to their appearance—as matted crystals, melting at 153° C.; tufted crystals, having a melting point of 166–167° C.; glistening crystals, not melting at 250° C.

This work of investigating the derivatives of chimaphilin was undertaken at the suggestion of Professor Trimble, and was conducted under his direction.

The chimaphilin used in these experiments was procured by distilling water with the coarsely-ground *Chimaphila umbellata* of the market. The crystals were collected from the condenser and the light yellow distillate. The color, odor and taste of the latter suggesting the presence of dissolved chimaphilin, it was accordingly shaken with ether, which removed all color, and, upon evaporation, left a very small quantity of chimaphilin, and some volatile oil of a strong odor.

When freshly isolated, the crystals had a melting-point of 109° C. By recrystallization from alcohol of specific gravity ·820, and, through precipitation of a concentrated alcoholic solution with water, the melting-point was raised to 114° C.

The solubilities of the principle were found to be the same as those assigned it by former investigators.

When applied in the dry state to the skin, the crystals produced, after a few minutes, a burning sensation, which became quite intense. That the identity and purity of the crystals might be further proven, they were submitted to ultimate analysis, the result of which is compared with the composition assigned the principle by Peacock.

	Found. Per Cent.	Calculated for $C_{24}H_{21}O_4$ Per Cent.
Carbon	77·30	77·21
Hydrogen	5·76	5·63
Oxygen	16·94	17·16

From this purified chimaphilin the following compounds were prepared:

CHLORINE DERIVATIVE.

Pure dry chlorine gas was conducted through a solution of the crystals in absolute ether. The reddish-yellow color of the solution gradually became paler, until at the end of three hours it retained but a light yellow tint.

Nothing was deposited from the solution so treated, but, upon the spontaneous evaporation of the ether, tufts of light-yellow-colored, needle-shaped crystals remained. They melted between 93° and 94° C., thus showing their difference from chimaphilin. They were soluble, to some extent, in a 10 per cent. solution of potassium hydrate, to which they imparted a faint pink color, which, upon heating, changed to yellow. When their solution in potassium hydrate was acidified with nitric acid and tested with silver nitrate, a distinct precipitate of silver chloride was obtained. The action of ammonium hydrate was similar to that of potassium hydrate.

A combustion of the derivative (silver-foil being used to absorb the chlorine), afforded the following figures:

Carbon	54·33 per cent.
Hydrogen	4·63 "

To estimate the chlorine, a mixture of the derivative and calcium carbonate was heated to redness in a piece of combustion tubing for one hour. The tube was allowed to cool, then broken, and its entire contents treated with water, and afterwards with nitric acid in excess. The solution was filtered from the fragments of glass, and completely precipitated with silver nitrate. The resulting silver chloride was collected, washed, and subsequently dried at 130° C. Its amount indicated the presence of 28·22 per cent. of chlorine in the derivative.

It would therefore appear, from the results obtained by analysis, that this compound is a tetra-chlor addition product of $C_{24}H_{22}O_6$, and, for convenience of comparison, the matter may be tabulated as follows:

	Found. Per Cent.	Calculated for $C_{24}H_{22}O_6Cl_4$ Per Cent.
Carbon	54·33	55·92
Hydrogen	4·63	4·07
Chlorine	28·22	27·57
Oxygen	12.82	12·44
	100·00	100·00

A bromine derivative was made by adding an ethereal solution of bromine to a solution of chimaphilin in ether. The addition was continued as long as the color of the bromine disappeared. The derivative formed tabular crystals, which underwent decomposition when exposed to the air.

ACTION OF ACETIC ANHYDRIDE.

A quantity of chimaphilin was boiled with acetic anhydride for four hours. When the resulting solution was poured into water, a crystalline precipitate, having the appearance of the original chimaphilin, was produced. A melting-point determination, the complete volatilization and the sublimation of the precipitated substance, proved the correctness of that opinion.

ACTION OF NITRIC ACID.

Chimaphilin was dissolved in chemically-pure nitric acid, of specific gravity, 1·42. The solution was kept in a water-bath, at a temperature of 90° C., for one hour. During this time, red fumes were emitted. The resulting liquid, when allowed to cool, separated a mass of lemon-yellow tabular crystals. These were collected and washed with water. Another lot of the same crystals was obtained by evaporating the solution to dryness on a water-bath.

After several recrystallizations from absolute ether, the crystals were found to melt to a red-brown liquid at a temperature of 153° to 154° C. When recrystallized from alcohol, a decomposition into resinous substances, incurring great loss of material, took place. The product of the action of the nitric acid was somewhat soluble in a 10 per cent. solution of potassium hydrate, producing therewith a reddish-yellow liquid. This color was destroyed by strong acids, but it was not restored by the addition of alkali in excess.

The action of ammonium hydrate was similar to that of the fixed alkali.

A combustion of the product showed the following results:

Carbon	63·64 per cent.
Hydrogen	6·57 "

Both silver-foil and copper-turnings were used in the tube, to insure the decomposition of the oxides of nitrogen.

An estimation of nitrogen by the soda-lime method showed 1·70 per cent., while one by the Kjeldahl method indicated 2·19 per cent. of the element.

These results seem to indicate that the compound was a nitro-derivative of an oxidation product of chimaphilin.

Fairbanks stated that concentrated nitric acid did not affect the crystals of chimaphilin, while Peacock reported that they dissolved in nitric acid, and were precipitated, apparently unaltered, by the addition of water.

The residue of *Chimaphila umbellata*, from which the water had been distilled to obtain the chimaphilin, was dried and afterwards percolated with petroleum ether. This solvent extracted a considerable quantity of green coloring matter, and a small amount of a granular substance. The amount of the latter seemed to increase in the percolate as the drug came nearer exhaustion of the coloring matter.

The greater part of the petroleum ether was recovered from the percolate, which subsequently, upon cooling, separated the granular substance mentioned. When cool, the liquid portion which retained the green color was filtered off. Trial having shown that the granular substance upon the filter was but sparingly soluble in alcohol, it was washed with that liquid to remove traces of green color.

It was found best to recrystallize the principle by the spontaneous evaporation of its chloroformic solution—a plan that was adopted, and by means of which colorless, many-sided crystals were obtained. These crystals possessed little or no taste, but produced a burning sensation when their chloroformic solution was applied to the skin. They did not melt at 250° C. When carefully heated on platinum foil, they fused to a clear liquid and sublimed, apparently unchanged, passing off as white clouds.

When rapidly heated, the crystals burned with a smoky, luminous flame, and were entirely consumed.

Benzol, like chloroform, readily dissolved the crystals, while ether, absolute alcohol and petroleum ether, showed slight solvent power only.

Purification seemed to have decreased their solubility in the last liquid.

This principle was obtainable from both the stem and the leaf of the plant.

Though melting at a temperature distinctively different from that recorded by Beshore for the substance discovered by him, and to

which he gave the formula $C_{10}H_{19}O$, this principle showed so much resemblance in solubility to the same, that a combustion was deemed necessary to prove or disprove their identity.

The results of such analysis were:

	Average Found. Per Cent.	Calculated for $C_{10}H_{19}O$ Per Cent.
Carbon	77.53	77.42
Hydrogen	11.25	12.25
Oxygen	11.22	10.33
	100.00	100.00

By not melting at 250° C., by corresponding solubility, and by some general properties, the principle also showed a similarity to the "glistening crystals" described by Peacock; but as the result of a combustion of the same, he reported several per cent. more of carbon than the writer found.

A collection of the species *maculata* was made on November 12, 1894, near Haddonfield, New Jersey. About 1 kilo. of the whole plant was at once macerated with water, which was distilled off without delay. Crystals of chimaphilin were obtained in the distillate. Peacock (*vide loc. cit.*) did not obtain chimaphilin from fresh *Chimaphila maculata* gathered in the same locality in July, 1891.

His reason for stating it absent was that "no solid separated in the condenser, nor in the distillate, even upon allowing the latter to stand for a month." In view of the fact that chimaphilin is slightly soluble in water, and under the circumstance of no mention by him of having shaken the distillate with ether or other solvent to separate the small amount that is soluble, such traces might have escaped his notice. Upon allowing another portion of the same collection to dry in the air of a room for forty days, he was enabled to detect the principle by the usual method.

Some *Chimaphila umbellata* was gathered at St. Davids, Pennsylvania, on December 12, 1894. Crystals of chimaphilin were obtained when the fresh drug was subjected to the usual distillation process. From the difference in the experience of Mr. Peacock and the writer, the latter is led to believe that the amount of chimaphilin present in the fresh herb depends upon the time of collection.

The writer is much indebted to Messrs. Peacock and Manger for the *Chimaphila umbellata*, from which the chimaphilin was prepared.

BLACK SULPHUR.

By Lyman F. Kebler.

Synonyms.—*Native sulphur, sulphur vivum, horse brimstone, crude sulphur, sulphur nigrum, and Magnus "black sulphur."*

Black sulphur was first mentioned[1] by Magnus in 1854, and again studied[2] in 1856 by the same worker. As is well known, a portion of the sulphur that has been melted and allowed to cool is incompletely soluble in carbon disulphide. This residue, after repeated melting and extracting with carbon disulphide, constituted Magnus' first "black sulphur." It was subsequently prepared, by the same investigator, by mixing sulphur with a very little oil, sootor charcoal and fusing; a bluish black, soft, plastic mass resulted, which was only partially soluble in carbon disulphide. Magnus did not consider it an allotropic form of sulphur, but a special modification.

A number[3] of investigators have contributed to the knowledge of black sulphur, but it was left for Fr. Knapp to exhaustively study the subject. He studied the conditions under which the largest per cent. is produced, as well as the most uniform product formed. Black sulphur is evidently not a modification of sulphur, but consists of a carbonaceous mixture which forms a nucleus, affording a surface for the adhesion or condensation of the sulphur, or the carbonaceous material in some manner occludes the sulphur. Whatever may be the facts, a uniform product is hard to prepare.

As a rule, pharmacists have a vague conception of what black sulphur is, if they know anything about it. Some think it is a mixture of sulphur and antimonious sulphide; others say it may be Ethiops mineral, or sulphureted antimony, depending on what it is to be used for.

What are the real facts concerning its composition? The writer has been able to secure only three samples from many drug stores. Below are the results of the investigation of these samples.

(1) Sulphur 81·58 per cent.; antimonious sulphide, 12·68 per cent. sand and earthy matter, 5·74 per cent.

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[1] 1854, *Pogg. Ann.*, 92, 308.

[2] 1856, *Pogg. Ann.*, 99, 145.

[3] 1865, Dietzenbacker, *Pogg. Ann.*, 124, 644.
1879, T. Gross, *Berliner Akademie-Berichte*, 783.
1880, H. C. Jones, *Chem. News*, 41, 244.
1888, *J. prakt. Chem.*, (2) 38, 48, and 1891, *Ibid.*, (2) 43, 305.

(2) Ground limestone, 53·00 per cent.; coal-dust, 47·00 per cent. (3) Sulphur and other combustible matter, 57·09 per cent.; metallic iron, 17·91 per cent.; sand and earthy matter, 25·00 per cent. From number three, by repeated extractions with carbon disulphide, the writer succeeded in extracting 39·13 per cent. of sulphur. It was not all extracted, however. What a heterogeneity the above results present!

These few words are presented here solely with the view of bringing about a unity on black sulphur. The writer would be pleased to receive any information on this subject by any pharmacist meeting this article. Your opinions regarding the composition of black sulphur is especially desired. The results, if any, will be made known in this journal at some subsequent date.

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ARTIFICIAL OIL OF WINTERGREEN.

BY HOUSTON T. THAYER, PH.G.

The subject of this paper was one of the organic compounds by the production of which synthetical chemistry first showed itself to be a rival of Nature's mysterious functions. And as, under the name of methyl salicylate, it is a prominent member of the list of articles added to the Pharmacopœia at the last revision, a practical process for its preparation would seem to be of interest to the pharmacist who might wish to make his own supply.

The method of producing it long in use is that described in works on chemistry as consisting of the saturation of a solution of salicylic acid in methyl alcohol with hydrochloric acid gas, and of subsequent purification, either through distillation of the mixture by the aid of steam or by repeated washing with water.

In following this outline without taking the precaution of drying the hydrochloric acid gas, the availability of the process is not likely to be recognized, as the salicylic acid separates as a solid, and for that reason does not easily combine with the methyl alcohol.

Some authorities, however, direct the use of sulphuric acid with which to digest the salicylic acid and methyl alcohol, instead of the usual treatment with hydrochloric acid gas.

On p. 8 of THE AMERICAN JOURNAL OF PHARMACY for 1887, Charles Bullock published, under the title of "Synthetical Oil of Gaultheria," the following process:

Salicylic acid	½ oz.
Methyl alcohol, absolute	2 fl. ozs.
Sulphuric acid	1 fl. oz.

Dissolve the salicylic acid in the alcohol; then add gradually the sulphuric acid; warm gently during twenty-four hours; then distil from a retort, into which a current of steam is introduced. The distillate is to be well washed and separated by decantation.

The product afforded by this process has, when recently prepared, a rank odor, but it is said in the article cited that the odor "improves by keeping."

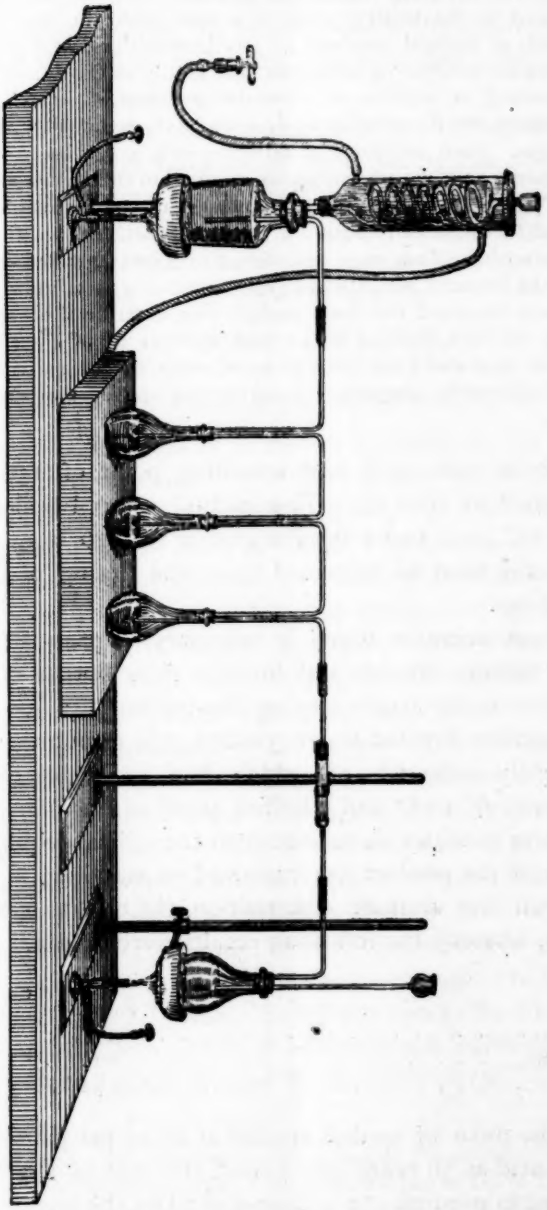
Although the writer does not object to the use of absolute methyl alcohol, he is of the opinion that it adds unnecessarily to the cost of the oil, because such an article is obtainable only by the expenditure of much work and time—items of significance scarcely expected to be compensated by any probable superiority of the product over that obtained when a methyl alcohol of reasonable purity is employed.

In the contribution mentioned, attention is directed to an artificial oil then recently introduced into commerce. It is described as being colorless, as having a specific gravity of 1·176 and as boiling at 398° F. (203° C.).

The specific gravity compares favorably with 1·180, the figures required by the Pharmacopœia of 1880 for the natural oil of wintergreen, in place of which the synthetical oil was obviously intended to be used. And the boiling point, while notably lower than that of pure methyl salicylate, fulfilled the necessity of a temperature above 200° C., required at that time, *vide* National Dispensatory, third edition, p. 1060. The cause of this variance in the boiling point may have been the presence of the methyl ether which Mr. Bullock suspected in the sample.

By a number of experiments the writer has been enabled to develop the hydrochloric acid method already described as the one most frequently directed for the preparation of the artificial oil, and to devise the following practical and economical process, which yields an oil of good qualities:

Salicylic acid	505·470 grammes.
Methyl alcohol	690·850 grammes.



APPARATUS FOR THE PRODUCTION OF METHYL SALICYLATE.

The salicylic acid was added in portions to the methyl alcohol contained in a wide-mouthed flask until a saturated solution was obtained. This solution was then heated to the boiling point on a water bath, the flask having been connected with an upright condenser. Dry hydrochloric acid gas was passed into the hot solution until the latter was thoroughly saturated. The flask was then disconnected, an addition of about ten grammes of salicylic acid made, the flask replaced and the solution again completely saturated with the hydrochloric acid gas. Such additions of salicylic acid and subsequent treatment with hydrochloric acid gas were repeated until all of the former substance had been added. After the last addition, the passage of the hydrochloric acid gas was continued for about two hours.

The contents of the flask were then found to have separated into two distinct layers, the lower of which was an oily liquid of a dark brown color. The upper layer was decanted, the lower washed with water until no longer acid to litmus paper, and then distilled from a flask with the aid of live steam.

The oil was separated from the excess of water by means of a separating funnel, and afterwards completely dried by the use of anhydrous calcium chloride.

The salicylic acid used had a melting point of 156°–157° C. It was dried at 100° C. The methyl alcohol boiled between 58° and 72° C., and had a specific gravity of ·820.

Especial care must be bestowed upon the drying of the hydrochloric acid gas.

The present operator found it necessary to pass the gas over anhydrous calcium chloride and through three bottles of sulphuric acid, as shown in the accompanying illustration.

The quantities directed above yielded 500 grammes of a colorless or slightly yellowish oil, which had an agreeable odor, a specific gravity of 1·187 and a boiling point of 221° C.

All of these qualities harmonize with the official requirements.

The odor of the product has improved on standing.

To ascertain the ultimate composition, the oil was submitted to combustion, whereby the following results were obtained:

	Found.	Calculated for $CH_3C_7H_5O_2$
Carbon	63·38	63·16
Hydrogen	5·10	5·26
Oxygen	31·52	31·58

Placing the price of methyl alcohol at $1.25 per gallon and that of salicylic acid at 56 cents per pound, the cost of the raw materials required to produce 500 grammes of oil by the process proposed would be 99 cents.

The proportionate rate for one pound would be 83 cents, while an allowance of 7 cents, which more than defrays the expense of salt and sulphuric acid (for the preparation of the hydrochloric acid gas) and heat needed to make that amount, raises the cost of the artificial oil to 90 cents per pound.

In connection with the consideration of methyl salicylate, it might be remarked that ethyl salicylate of good quality can also be made by this process. It is reported that the ethyl compound is sometimes substituted for the methyl. The odor of the ethyl salicylate is rather more delicate than that of the methyl salicylate. Specifically, methyl salicylate is decidedly the heavier.

DR. W. G. BOORSMA'S PLUMIERID.[1]

An infusion of the bark of *Plumiera acutifolia* P., an Apocynea, cures horses of chronic colic. The bark is very bitter; contains an acid, "plumiera acid," discovered by Altheer and Oudemans (Gen. Tijdschr. v. Ned Indië x, 1863, p. 183). This acid is not bitter.

A maximum yield of about 6 per cent. was obtained, in white crystals, of this bitter principle. (Minimum not given.)[2] The finely-powdered bark is hereto exhausted with alcohol. There is a brownish green, waxy mass left, when the alcohol is distilled off, *which is not bitter* when exhausted with water. The bitter principle has been dissolved in the water. Crystals form in this watery exhaustion, when it is evaporated *in vacuo* to a thin extract and left to itself for some time. The watery solution is treated with lead acetate. The excess of lead is removed with H_2S. The fluid is evaporated to a minimum and decolorized through charcoal. The product of this treatment is intensely bitter. It is washed with boiling amyl alcohol. The amyl alcohol is removed in a separator and at last by warming. The decolorization process is to be repeated until final product is colorless. Leave the watery fluid to itself for crystallization. Collect crystals, dissolve them in warm amyl alcohol and water, under addition of some MgO; filter warm. Leave again

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[1] Condensed from "Mededeelingen uit' s. Lands Plantentuin, 1894." The first series of these "Mededeelingen" are from the pen of Dr. M. Greshoff, and appeared in the AM. J. OF PH., Mar. 1891, p. 124. J. B. NAGELVOORT.

[2] The leaves contain only traces of it.

to crystallize. Dry crystals between filter paper and remove the odor of amyl alcohol by warming.

The bitter taste of the crystals is to be detected in a 1:15,000. solution (Plumierid is, therefore, much less bitter than quinine, which is to be detected in a 1:50,000 dilution. Referent.)

Plumierid does not contain nitrogen. Its solutions are neutral.

Plumierid does not reduce Fehling's fluid, when boiled with dilute acids; it is, therefore, an indifferent bitter principle.

Plumierid crystallizes with 2·5 per cent. water of crystallization. It commences to char at 150° C., but has not melted at 200° C.

Platinic chloride, gold chloride, silver nitrate, lead acetate, lead subacetate, mercuric chloride, potassium mercuric iodide, picric acid, nor tannin solutions produce a precipitate in its watery solution, 1:20.

Sulphuric acid dissolves it with an intense yellow color. A greenish black precipitate is thrown down in 24 hours, while the fluid is violet.

Potassium dichromate, added to its solution in sulphuric acid, gives green stripes. (Great caution is needed where green colors appear after the addition of potassium dichromate, not to draw a wrong conclusion. Referent.)

Nitric acid dissolves it colorless. This solution leaves a yellow red residue when evaporated.

Hydrochloric acid dissolves it colorless in the cold. The solution soon becomes yellow and red; a brown precipitate settles down after 24 hours, while the fluid is violet. The solution is immediately yellow and red when a few mgr. of Plumierid are boiled with 1 c.c. HCl. This solution, too, discolors and throws down a dark brown precipitate. The filtrate has dichroistic properties; is red by transmitted light, blue by reflected light. (Those dichroistic properties from boiling with HCl remind one of Resorcinol reactions. Referent.) A purple-blue colored fluid is obtained by dilution with water. An excess of caustic soda or ammonia changes the color to orange.

Plumierid has the formula $C_{30}H_{40}O_{18}.H_2O$. It is not poisonous.

The genus *Plumiera* seems to be rather remarkable from a phytochemical standpoint. Peckolt obtained a crystalline alkaloid from *P. lancifolia*, which he called agoniadine; *P. drastica* is a very active purgative.

THE PRODUCTION AND USES OF COTTON-SEED OIL.

By P. L. Simmonds, F.L.S.

I think I may claim the merit of having first suggested the production of cotton-seed oil. Forty years ago, in a course of lectures I gave before the Society of Arts and Manufactures in London, on "The Utilization of Waste Products," I mentioned, among other waste products, cotton seed, which was then an incubus cotton cultivators did not know how to get rid of.

The Council of the Society of Arts awarded me their silver medal for my valuable suggestions, and subsequently elected me a life member under one of their rules, in consideration of being eminent in the application of abstract science to the Arts, Manufactures and Commerce.

These lectures I afterwards expanded into a volume, under the title of "Waste Products and Undeveloped Substances," which went through several editions and is now out of print. I have reason to believe that the adoption of many of my suggestions has resulted in fortunes to some, and has utilized profitably much of the former waste in manufactures.

The Science and Art Department employed me to form a collection of waste products and their utilization, with a descriptive catalogue, which is now placed in the Bethnal Green Museum.

I had also to make a similar collection for the Austrian Government at the Universal Exhibition, held in Vienna in 1873.

To return to cotton-seed oil. At the time my suggestion was made of utilizing cotton seed for oil in 1855, the United States production was less than 1,250,000,000 pounds; now the production has risen to about 3,500,000,000 pounds. The first shipment of cotton-seed oil in the year ending June, 1872, was but 547,165 gallons, and few would have anticipated it would reach, in 1892, the enormous export of nearly 14,000,000 gallons, worth nearly $14,000,000. The various forms of cotton seed all yield good oils capable of being refined for dietetic use.

The oil possesses excellent lubricating qualities, and is useful for soap-making and for lamps. The quantity of oil produced, even in England, is large, the imports of cotton seed exceeding, in some years, 400,000 tons.

In the States the production of seed exceeds 3,000,000 to 4,000,000 tons, of which half is available for oil; 100 pounds of

seed will yield two gallons of oil. There are four qualities of oil made. The crude oil is of a dirty yellow to reddish color; on standing it deposits a slimy sediment. The second quality has a pale orange color, and is obtained by refining the crude oil with a solution of caustic soda. The yellow oil resulting from this process is further purified by being heated and allowed to settle again, or by filtration, and is called "yellow summer oil." "Winter yellow oil" is made from the above material by chilling it, until it partially crystallizes, and separating the stearin (about 25 per cent.) in presses, similar to those used for lard.

This is then treated with fuller's earth in a tank, which holds back the coloring matter, and the oil which issues from the filter press is almost white.

In 1893, there were probably 1,250,000 tons of cotton seed crushed in the United States. From this seed there were obtained 1,000,000 barrels of oil. It is estimated that 300,000 barrels were used in Chicago for making oil lard; and St. Louis, Kansas City and Omaha took 200,000 for the same purpose. About 250,000 barrels went to Holland for making margarine, and large quantities to Southern Europe for mixing with olive oil.

Cotton-seed oil appears to be useful for table purposes, and it is desirable that its use in the pure state, rather than as a mixture, should be encouraged. It ought, however, to be sold on its merits, and with the addition of some qualifying term, which will indicate its origin.

This oil has entirely replaced olive oil in America, and there is scarcely a restaurant in London or Paris in which this new "salad oil" has not taken the place of the old Lucca product. In Portugal every means are now taken to prevent the sophistication of olive oil with cotton-seed oil, or passing it off as a food oil of the same value as olive oil.

For pharmaceutical purposes cotton-seed oil cannot be regarded as a good substitute for olive oil. It saponifies with difficulty as a drying oil, and the coloration which it gives with nitric acid shows that if used for any preparation liable to oxidation it may give curious results. The density of crude cotton-seed oil is 0·920 to 0·933, and when refined 0·925 to 0.930.

To distinguish cotton-seed oil from olive oil, take pure, colorless nitric acid of the density of 1·40 and mix it with half the quantity

of oil in a test tube, closed with gum. After shaking it for several seconds, allow the tube to rest in a vertical position for five or six minutes. If the oil is from olives, the liquid is at first pale or colorless, changing to an ashy gray, with a slight yellowish hue. On shaking, a coffee-brown color will be seen if cotton-seed oil is present. The reaction is delicate enough to detect an adulteration of 5 per cent. of cotton-seed oil.

The shipments of cotton-seed oil from the United States have progressed as follows in decennial periods:

	Gallons.
1873	709,576
1883	415,611
1893	9,462,074

With the extended production of cotton in various countries—India, China, Egypt, Brazil and the United States—a great future awaits cotton-seed oil. Some idea of the magnitude of the future may be formed from the fact that British India produced in 1889 a little over 9,000,000 cwt. of cleaned cotton; that amount must have been obtained from 27,000,000 cwt. of seed. Allowing half this to be required for home consumption and seed for next crop, over 6,000,000 cwt. of seed should have been available for export, whereas the export of seed has hitherto seldom reached 37,000 cwt. This year the export of seed will be larger, as for the nine months already expired, nearly 89,000 cwt. has been shipped. The weight of seed may be estimated at three pounds for every pound of cleaned cotton.

NOTES ON SOME SAPS AND SECRETIONS USED IN PHARMACY.

By P. L. Simmonds, F.L.S.

[*Continued from p. 135.*]

Garcinia, sp. The yellow gum resin known as gamboge and used as a pigment and in medicine is believed to be obtained from different species of this family. From *G. cochin chinensis*, Chois., *G. Morella*, Desv., *G. pictoria*, Roxb., *G. Hanburii*, Hook. fil. Several Indian species of *Garcinia* seem to furnish gamboge.

It is chiefly received from Siam in the form of pipe or roll, and in cylindrical masses. It has a faint odor, and an acrid, rancid, afterwards sweetish taste. It is employed medicinally in the treatment of dropsical affections, amenorrhœa and obstinate constipation,

attended with torpidity of the bowels, and has frequently been found effectual in the expulsion of the tape-worm. It is a valuable drastic and hydragogue cathartic, and also possesses anthelmintic and diuretic properties. It consists of 75 per cent. of resin and 15 of gum.

On the Continent of Europe it is known as "gum gutte," from the mode of its preparation. When the sap of the tree is in active circulation, the leaves and young branches are broken off, and the yellow juice that flows from the wounds is collected in cocoanut shells, or twisted leaves, of the plant itself. This is afterwards poured into larger vessels, made of clay, and dried in the sun until it is of a proper consistence.

G. bowa, Roxb., yields a kind of gamboge of a somewhat paler color than that produced by *G. Morella.*

Gardenia lucida, Roxb. A fragrant exudation, known in India as "Dikamale resin," is procured from the tops of the branches. It is extensively used in Indian hospitals as a slight dressing for open wounds, to keep away flies from the sores, on account of its strong aroma.

Guaiacum officinale, Lin. A medicinal resin is obtained from the stem of this tree, called lignum vitæ. It exudes spontaneously, and is partly obtained by extracting with alcohol. The resin is obtained most copiously by wounding the tree, which is usually done in May. Another method is by heat. The trunk and larger limbs being sawn into billets of about three feet in length, an angular hole is bored lengthwise in each, and one end of the billets so placed on a fire that a calabash may receive the melted resin, which runs through the hole as the wood burns. It is also obtained in small quantities by boiling chips or shavings of wood in water, with common salt. The resin swims on the top and may be skimmed off.

The resin is inside reddish or greenish-brown, brittle, gray-white when pulverized, turns greenish in the air, has a balsamic odor and a sweetish bitter taste, which is at the same time acrid and irritating to the throat. The resin is chiefly used in gout, chronic rheumatism, etc. A decoction of the capsules, wood or bark is also used in medicine as a sudorific. A tincture made of the resin diluted with water is used to cleanse the mouth, strengthen the gums and relieve the toothache.

The British imports are small, seldom exceeding thirty or forty packages in a year. The guaiacum in tears is supposed to be the product of *G. sanctum*, Lin.

Humirium floribundum, Mart. This plant, in Brazil, yields from its trunk, when wounded, a fragrant, limpid, pale-yellow balsam, called Umiri, possessing the same medicinal qualities as Balsam of Copaiva. It is used by the natives for gonorrhœa, chronic cystitis, bronchitis, and all diseases attended with excessive secretion. A decoction of the bark is used as a remedy for coughs and derangement of the stomach. Another species, *H. balsamiferum*, Aubl., yields a similar balsam in Guiana.

Hymenæa Courbasil, Lin. A fine, transparent, fragant gum-resin exudes from this tree. In solution it has been given internally in doses of a teaspoonful for rheumatic and pseudo-syphilitic complaints, and employed externally as an embrocation. In Brazil the resin is mixed with sugar and rum, so as to make an agreeable emulsion or syrup, which is administered in tedious coughs, weakness of the lungs, spitting of blood and incipient phthisis pulmonalis. A decoction of the inner bark is said to act as a vermifuge.

Icica Tacamahaca, Kth. The fragrant, bitter resin of the above species is used in Brazil for making ointments. Another Tacamahaca from *Elaphrium tomentosa*, Jacqu., fetches in Mexico $1 a pound. The resin of *Icica heptaphylla*, Aubl., in Venezuela, takes the properties of Thus. When liquid it is a valuable remedy for coughs. A decoction of the bark is an emetic in fevers. The *Calophyllum Calaba*, Lin., yields East Indian Tacamahaca.

Icica icicariba, DeC., produces a great deal of the resin passing under the name of "Almaciga," which is much used in medicine and the arts. It is found in the provinces of Maranham, Para and Amazon, in Brazil. Another Icica, known as "Pave de brea," also furnishes it in the same provinces. Some of the resin known as Almaciga is said to be furnished by *Bursera balsamifera*, Pers., *Hedwigia balsamifera*, Sw., and is aromatic like incense. Elemi proper is from *I. icicariba*, DeC., and *I. araconchini*, Aubl., but is often replaced by the resin of other species of the same genus. The odorous resin which exudes from the trunk, gives off, in burning, a lively, agreeable odor. This is used as incense in the churches of French Guiana. It is sometimes used medicinally as balsam of Araconchi, but there is little demand for it in commerce. On

wounding the bark of the Jamaica birch (*Bursera gummifera*, Jacq.), a white, resinous sap exudes, which soon hardens and is in no way different from gum Elemi.

Elaphrium Jacquinianum and *E. elemiferum*, natives of Mexico, also produce a fragrant balsamic, glutinous resin, which furnishes one of the sorts of Elemi. Elemi is very friable, and, when heated, puffs up and melts. In boiling water it agglomerates without melting; slightly soluble in ether, insoluble in acetic acid and caustic soda, slightly soluble in carbonic sulphide, soluble in turpentine, slightly soluble in boiling linseed oil, benzine and oil of naphtha. Sulphuric acid dissolves it, coloring it a dark bistre; nitric acid colors it a dirty yellow without dissolving it, and ammonia does not act upon it. What is known as Manila elemi is believed to be a resinous exudation from *Canarium commune*, Lin. In burning, elemi gives out a lively and agreeable odor, hence it is used for incense in some churches.

KINO. Under this common name is known as an astringent and resinous deposit, being the dried sap of several trees of India, Africa and Australia.

The best Kino, which contains about 75 per cent. of tannic acid, exudes from the sap of *Pterocarpus marsupium*, DeC., in India, and dries in angular pea-like grains in the course of a day or two. Another kind which was originally brought from Africa, under the native name of Kano, is the sap of *Pterocarpus erinaceus*, Poir.

Nearly all the Australian Eucalypti exude astringent gum resins in considerable quantity, resembling Kino in appearance and property.

The red juice which flows from fissures in the barks of the Indian creepers, *Butea superba* and *B. frondosa*, Roxb., yields some of the Indian Kinos. Kino is commonly used in medicine as a powerful astringent, especially in diarrhœa, chronic dysentery and other such cases, and as an injection in leucorrhœa, and as an application to ulcers.

The tincture of Kino, although used medicinally, has an inconvenience, which is found to arise from its changing to the gelatinous form.

Kino resin is dearer than it has ever been within living memory, £20 per cwt. being now the nominal quotation.

The British imports are very small, only averaging 15 or 16 packages now, whereas they were 98 in 1884, and 73 in 1888.

Lactuca species. From several species of Lettuca—*L. virosa*, *L. scariola*, *L. altissima* and *L. sativa*—the drug known as "Lactucarium" is obtained. It is the hardened, milky juice which exudes from the cut stems in Germany, France and Austria. The average yield from each plant is only from 40 to 50 grains. It occurs in commerce in the form of angular pieces of a brownish color, internally opaque and wax-like. It possesses slightly narcotic properties and is useful in coughs.

Laurus gigantea.—"Caparrapi balsam" is referred to this tree. It is so named from the village of Caparrapi, in the province of Cudinamarca, Colombia, where it is prepared. It may probably be derived from *Oreodaphne epifera*, Nees. The seed is oily and has a burning taste like capsicum. The balsam has an aromatic odor and resembles balsam of Tolu, but is more fluid.

In medicine it is used by the natives as a stimulant in catarrhal complaints, and is also employed by them in the treatment of snake bites and the stings of poisonous insects.

Liquidambar orientale, Miller; *L. imberbe*, Aiton. A balsamic gum-resin, prepared from the bark, is known as liquid Storax, and in the East as "Rose Malloes." It is stimulant and detergent and similar in action to the balsams of Peru and Tolu.

Another species, *L. styraciflua*, Lin., exudes a sweet gum through cracks in the bark and wounds in the trunk, during all seasons of the year, which hardens on exposure to the air. It is much esteemed by children for chewing and is soluble in water. This gum yields a balsam more terebinthine in odor, but almost as pleasant as Tolu balsam. This syrup is produced in the Southern States of America. It is transparent, amber-yellow, has the consistence of a thick oil, and an aromatic, bitter taste. It has been used in the form of ointment for healing indolent ulcers, and for cutaneous diseases.

A syrup of Liquidambar is used for the diarrhœa of infants. It is largely exported from Bombay to China, where it has for many centuries been used as a medicine. The dried and compressed residual bark, after boiling for the storax, constitutes the fragrant cakes formerly common and well known in Europe, under the name of *Cortex Thymiamatis*.

L. altıngia, Blume, also yields the fragrant balsam known as liquid storax. It is vanilla-scented, containing much styrol and styracin, and is often used for imparting scent to some sorts of tobacco and cigars, and also for keeping moths from clothing. Its use in medicine is more limited than in perfumery. The solid exudation known as storax is from the stem of *Styrax officinale*.

Moringa pterygosperma, Gaertn. This small tree yields a gum which is white as it exudes, but gradually turns to a mahogany or claret color as it dries. This is one of the balsa Tragacanths which are used in native medicine.

Musa paradisiaca, Lin. The sap has medicinal properties; it is used in San Domingo to stop internal and external hemorrhage, as tannin is in other countries. At the Philippines it is used to heal a species of venereal disease, very common in the province of Biscayas.

[*To be continued.*]

THE CHEMISTRY OF IPECACUANHA.[1]

By Dr. B. H. Paul and A. J. Cownley.

In some papers published conjointly by us previously, in the *Pharmaceutical Journal*,[2] it has been shown that the descriptions generally given of the alkaloid, to which the medicinal action of ipecacuanha is attributed, are for the most part erroneous. It is stated that this constituent of the drug, as hitherto obtained, is chemically an individual substance; but the accounts given of its physical characters are remarkably discordant. We have, on the contrary, shown that ipecacuanha resembles cinchona bark—a product of the same natural order—in containing at least two alkaloids, and probably other alkaloids in smaller proportions.

Of the two alkaloids which we have isolated and examined, one is uncrystallizable, but capable of forming salts which are crystallizable, though for the most part very freely soluble. This base is readily soluble in ether, alcohol or chloroform, very sparingly soluble in water or petroleum spirit, and insoluble in solutions of caustic alkali. We have retained for it the name of emetine.

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[1] *Phar. Jour. Trans.*, February 16, 1895.
[2] *Ph. J.*, liii, 61, liv, iii, 373.

The other alkaloid—cephaeline—is crystallizable, less soluble in ether than emetine, but freely soluble in alcohol or chloroform, much more soluble than emetine in hot petroleum spirit, and readily soluble in solutions of caustic alkali.

By these characters the difference between the two alkaloids is very distinctly marked. There are also differences in their melting points—emetine melting at 68° C., cephaeline at 102° C.—and in their percentage composition, as is shown by the following comparison :

	Emetine.	Cephaeline.
Carbon	72·01	71·28
Hydrogen	8·86	8·69
Nitrogen	5·75	6·24
Oxygen	13·38	13·79
	100·	100·

These figures give as their most simple expression the following formulæ :

Emetine. $C_{15}H_{22}NO_2 = 248$ Cephaeline. $C_{14}H_{20}NO_2 = 234$

Analysis of the neutral hydrochloride salts has shown that the quantities corresponding to these formulæ are respectively equivalent to one molecule of hydrochloric acid.

The very marked peculiarity, common to both alkaloids, of forming crystalline salts more readily in the presence of excess of acid than when neutral solutions are slowly evaporated, led at first to the erroneous conclusion that neutral cephaeline salts were uncrystallizable and that the crystallizable salts of both emetine and cephaeline were acid salts. It has since been ascertained that cephaeline hydrochloride can be obtained in well-defined prismatic crystals when a slightly acidified solution is slowly evaporated, and that this salt contains equal molecular proportions of alkaloid and acid.

In the case of emetine the influence of an excess of acid in determining the formation of a crystalline salt is still more marked. On adding a drop of moderately strong hydrochloric acid to a particle of emetine, a mass of acicular crystals is at once formed.

Both emetine and cephaeline are very sensitive to the influence of light. Though perfectly colorless when pure and in a free state, they rapidly acquire a yellow color when exposed to sunlight.

Solutions of the alkaloids in alcohol, chloroform, benzene or ether, also become colored on exposure to light, with formation of a reddish-colored deposit. The salts of both alkaloids, on the contrary, do not appear to undergo similar alteration, but in a pure state remain perfectly colorless when exposed to light.

Since the publication of the last paper on ipecacuanha a third alkaloid—the probable existence of which has already been indicated—has been isolated in small quantity. It exists in the drug in very small amount relatively to emetine and cephaeline, and it differs from those alkaloids in being very sparingly soluble in ether. This alkaloid is soluble in alkaline liquids, and it remains in the ammoniacal liquor from which emetine and cephaeline have been extracted by shaking with ether. It was extracted from that liquor by shaking with chloroform. The quantity obtained as yet was too small to admit of complete examination, but the physical characters of this alkaloid distinguish it in a very definite manner. It is a crystallizable substance obtainable by slow evaporation of an ether solution in well-defined transparent prisms of a pale lemon-yellow color. It melts at about 138° C., neutralizes acids, and apparently has a much higher molecular weight than emetine or cephaeline. It dissolves readily in alcohol or chloroform, the solutions becoming dark-colored on exposure to light and depositing a dark brown substance.

The failure of most previous observers to arrive at correct conclusions in regard to the alkaloids of ipecacuanha presents some collateral features of interest, inasmuch as it shows how largely the results of such investigation may be determined by accidental circumstances. The extraction of ipecacuanha with chloroform in the presence of caustic potash, adopted by Lefort, naturally furnished a product consisting of a mixture of all the alkaloids, and in the absence of any ascertained distinction between them their separation was impossible. Hence the formula assigned to emetine by that observer, on the basis of Dumas' analysis, was inaccurate. In the subsequent investigation by Lefort and Wurtz the result arrived at was defective for the same reasons, although the mixed alkaloids were then obtained in a condition of greater freedom from impurity by extracting the drug with ether in presence of lime.

The result obtained by Podwyssotzki, by using ferric chloride to get rid of the tanni constituent, was vitiated by the use of petro-

leum spirit for extracting the drug. While the product thus obtained was an indefinite mixture of cephaeline and emetine as a consequence of the action of that solvent on both the alkaloids, probably the greater part of the emetine was not extracted at all by the petroleum spirit. In the investigation by Kunz petroleum spirit was also used for extraction with a similar result, as shown by the fact that the alkaloid obtained is described as (partially?) soluble in caustic alkalies. The formula deduced from analysis by Kunz was, therefore, necessarily incorrect, as the material operated upon by him must have been of a mixed nature. The experiments made by Kunz for the purpose of ascertaining the constitution of emetine were also for the same reason fallacious, and, therefore, no importance can be assigned to the conclusions arrived at by him in 1887, or to those which he has more recently put forward on the same basis.

The investigation of the alkaloid of ipecacuanha by Glénard was, however, more fortunate in its result. That circumstance was due to the care taken in obtaining the alkaloid in the state of a crystallized neutral hydrochloride, after extracting it from the drug by treatment with lime and ether. As a natural consequence of this mode of operating, the cephaeline was eliminated, and emetine was isolated in a pure condition, as shown by the results of Glénard's analyses, which correspond very closely with our own. Indications of the existence of another alkaloid were observed by Glénard, but they were not followed up by him.

Glénard's observations appear to have received little notice, however, and in most chemical works the formula assigned to emetine by Kunz has been adopted as the most satisfactory. That view must now be abandoned, since the data already published in our previous papers prove that the substance to which it relates could not have possessed chemical individuality.

It is satisfactory in connection with this point to be able to refer to results obtained by Messrs. E. Merck, of Darmstadt, in following up our observations on the alkaloids of ipecacuanha. In the *Bericht*, for 1894, recently published by that firm, it is stated that on repetition of our work in their manufactory, our descriptions have been fully confirmed, while the statements of Dr. Kunz-Krause could not be adopted. Following the indications given in the papers already published by us, Messrs. E. Merck now manufacture emetine and

cephaeline and their salts, and announce that they are prepared to supply these substances for medicinal use. We understand that they are already receiving orders from England.

The reputed value of ipecacuanha in the treatment of acute dysentery gives a great importance to this drug, but its emetic action has been found an inconvenient objection. Acting upon the assumption that the emetic action is due to the alkaloid, it has been proposed to make use of the drug from which that constituent has been removed. The successful results obtained by some medical men in India with de-emetinized ipecacuanha suggest the possibility that the value of the drug as a remedy for dysentery may be due to some other treatment than the alkaloid.

Some attempt was therefore made to isolate and study another constituent of ipecacuanha which has been described by Willigk, under the name of ipecacuanhic acid, as analogous to tannic acid and having a composition represented by the formula $C_{14}H_{18}O_7$. Following on the lines of Willigk's process, an alcoholic extract of ipecacuanha was mixed with basic lead acetate until no further precipitate was formed. The lead precipitate, collected and thoroughly washed with strong alcohol, was treated with weak sulphuric acid not quite sufficient to convert the whole of the lead into sulphate, and the clear alcoholic liquid was evaporated to dryness. In that way a reddish-brown amorphous material was obtained, amounting to about 2·25 per cent. of the drug, and corresponding to Willigk's description—very soluble in water, or alcohol, of bitter taste, and giving a green coloration with ferric salts, but not precipitated by gelatin. It was found to have no emetic action in doses of 4 or 5 grains. After boiling with acid it reduces Fehling's solution. The product so obtained was, however, a crude material, and probably of a mixed character. By treatment with absolute alcohol it was almost entirely dissolved, leaving about 5 per cent. of residue. The solution, mixed with dry ether, gave a white precipitate amounting approximately to 20 per cent., which darkened on exposure, and presented some resemblance to saponin, and, after boiling with acid, it reduced Fehling's solution. On evaporating the ether alcohol solution a residue was obtained amounting to about 60 per cent., which was soluble in water, and gave a dark green color with ferric chloride. The water solution did not froth on shaking, but after boiling with acid it reduced Fehling's solution.

These characters point to the probability that Willigk's ipecacuanhic acid was not a definite substance, but a mixture, and further examination will be requisite for ascertaining its true chemical nature. That appears to be of importance as regards the medicinal action of ipecacuanha, since it is stated on good authority that the utility of the drug in the treatment of dysentery is augmented by the removal of the alkaloids.

The two alkaloids, emetine and cephaeline, are contained in the ipecacuanha of New Grenada, as well as in that of Brazil, the only difference in this respect being the larger relative proportion of cephaeline in the New Grenada drug. So far, therefore, as the medicinal effects of the drug are due to these alkaloids jointly, there would appear to be but little difference between Brazilian ipecacuanha and that of New Grenada, so that the latter might, without disadvantage, be made official in the Pharmacopœia.

Assuming that the medicinal properties of ipecacuanha are due to the alkaloids emetine and cephaeline, it may be inferred from the characters of these substances that in making galenical preparations of the drug, a process which would insure their conversion into salts would be preferable to one furnishing a product in which the alkaloids were in a free state and liable to alteration under the influence of light. In that respect the acetic acid extract used in the preparation of the official B. P. wine would seem to be well adapted for the purpose, since solutions of the salts do not appear to undergo alteration when heated, unless it be that the acetic extract is too mixed a product, containing some constituent which helps to destroy or remove the alkaloids. Mr. John C. Umney's observations on the loss of alkaloid in ipecacuanha wine to the extent of one-fifth seems to point in that direction. But now that the alkaloids or their salts are obtainable in a pure state, a very excellent ipecacuanha wine, suitable for administration as an expectorant, can be made by dissolving half a grain of emetine hydrochloride in four ounces of sherry.

SWEET CASSAVA.

By Harvey W. Wiley.

(Abstracted from Bulletin No. 44, U. S. Department of Agriculture, Division of Chemistry.)

In the southern peninsula of Florida, and growing well up into the frost belt, is found in many localities a cultivated plant known as cassava, or sweet cassava. From a careful study of the climatic conditions under which the plant flourishes, it is safe to assume that it may also be grown with success in southern Alabama, Mississippi, Louisiana and Texas. Cassava is a name which should properly apply only to the purified starch derived from the roots of the plant, but it has passed into general use to designate the plant itself. Botanically, the plant is known as *Janipha manihot, Manihot utilissima, Jatropha manihot, Manihot aïpi, Manihot læflingii,* and *Manihot palmata.* One of its common names is manioc plant.

There is properly only one variety of the plant growing in Florida, while that variety which grows in the tropics contains so much hydrocyanic acid as to render it poisonous. The variety grown in the subtropical region of Florida, however, contains only a small quantity of hydrocyanic acid, and is, therefore, commonly known as sweet cassava. It is quite probable that after the tropical variety has grown for some time in a subtropical climate, it would lose largely its poisonous properties.

The attention of the Division of Chemistry was first called to the cassava plant as an article of food and a possible source of starch, in 1888, in a letter received from Mr. R. H. Burr, of Bartow, Fla., who also sent a package of the roots. These roots were long, slender and of various sizes, some of them two feet long and weighing several pounds. The analysis of the substance, exclusive of the bark, calculated to dry substance, is given in the following table:

	Per Cent.
Ash	1·94
Oil (petroleum ether extract)	1·27
Ether extract (resins, etc.)	0·74
Alcohol extract (amides, sugars, glucosides, etc.)	17·43
Crude fibre	4·03
Starch	71·85
Albuminoids (calculated from nitrogen)	3·47
	100·73

The amount of starch compares fairly well with the best varieties of potatoes. On account of the large quantities of sugars present, the cassava root could be more economically used for the manufacture of glucose than for starch.

A larger quantity of the root was obtained from Florida, the bark separated from the root, and each subjected to analysis, with the following results:

	Peeled Root.		Fibre after removal of Starch.	Bark of Root.	
	Fresh.	Dry.	Dry.	Fresh.	Dry.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Moisture	61·30	—	—	61·30	—
Ether extract	·17	·44	·30	·66	1·70
Albuminoids (N × 6·35)	·64	1·66	1·02	2·29	5·91
Starch	30·98	80·06	64·64	—	—
Fibre	·88	2·26	10·68	3·83	9·89
Ash	·51	1·31	1·42	2·02	5·23
Undetermined	5·52	14·27	21·94	29·90	77·27
	100·00	100·00	100·00	100·00	100·00

With the starch in the analysis given above is reckoned also the soluble carbohydrates, consisting almost exclusively of cane sugar, and of which, in an analysis of another portion of the dry substance, as high as 17 per cent. was found. In the laboratory it is not difficult to prepare crystallized cane sugar from the aqueous extract of the fresh pulp. The percentage of sugar in the plant, however, is too low to excite any reasonable hope of the preparation of this article on a commercial scale. The most promising way to save it is by conversion into glucose, as indicated in another place. The undetermined portion consists of the digestible fibre and carbohydrates of the pentose series. The pentosans in the fibre were determined by the furfurol process, as modified by Krug, and the amount in the air-dried material was found to be 3·92 per cent., and in the material after the removal of the starch, 5·33 per cent.

The amount of mineral matter taken from the soil by the 100 kilos of the fresh root is approximately only one-half a kilo. The

albuminous matters are also present in small quantities, being only slightly more in amount than the ash itself. The plant, therefore, is one which seems particularly suited to feed almost exclusively from the air and water, and hence is one which could be recommended on the sandy soils of Florida as a crop which would require the minimum of fertilization.

The ash was found to consist of silica, ferric oxide, calcium oxide, magnesium oxide, sodium oxide, potassium oxide, phosphoric acid, sulphuric acid, carbonic acid, and chlorine. The calcium, potassium and phosphoric acid made up three-fourths of the ash in the peeled root, while silica and potassium predominated in the bark from the root.

Quite a number of preparations are made from the starch of the root, and among them may be mentioned: (1) Tapioca; the first portions of starch washed out, especially, produce an excellent article of tapioca when treated in the usual way. (2) Glucose; both the fresh root and the extracted root yield full theoretical amounts of glucose, and samples of this article were made by the conversion of the starch both by sulphuric acid and by diastase. The samples of glucose made from the starch were exceptionally good, especially when diastase was used, the glucose in this case containing large quantities of maltase. (3) Alcohol; the glucose on fermentation affords the usual quantity of alcohol. (4) Cane sugar; a beautiful preparation of cane sugar was made from the water used in washing out the starch. The amount of cane sugar, however, is not large enough to warrant its extraction on a commercial scale from the waters used in washing. It is, however, present in such quantity as to indicate that in making glucose it is better to use the whole root, and so obtain the product from both the cane sugar and the starch, rather than to make it from the starch alone.

The general result of the investigation is to establish the fact that the cassava is a plant of high economic value, and worthy of the attention of those interested in the carbohydrate products of the country.

Cassava has been grown for one year on the department experiment station at Runnymede (post-office, Narcoossee), Osceola County, Florida. The field in which the crop was grown is high pine sand, with almost no other ingredient.

Attempts were also made to grow cassava in a piece of very wet

muck land on the station, in which sugar cane would not grow to any advantage. An immense development of tips was secured, some of the plants reaching a height of 10 feet, and resembling young trees. The root development was fair, but not commensurately increased with the top growth.

The profits which the farmer may make from growing this crop, and the manufacturer from using it, should be based upon a yield of 4 or 5 tons per acre. If it be desired to make starch from the plant, we may suppose, as a minimum rate of yield, that 20 per cent. of the weight of the fresh root may be obtained as a merchantable starch of a high grade. On a yield of 4 tons per acre, this would amount to 1,600 pounds. Compare this with the weight of starch obtained from Indian corn producing 40 bushels per acre. The yield of merchantable starch of a high grade may be placed 35 pounds per bushel, which for 40 bushels would amount to 1,400 pounds. It is thus seen that the yield per acre in the matter of starch from cassava would be fully equal, if not superior, to that from Indian corn. If the manufacture of glucose be considered, the estimate is even more favorable.

CONCLUSIONS.

(1) Cassava can be cultivated with safety and profit in the greater part of the peninsula of Florida, and probably also in southern Alabama, Mississippi, Louisiana and Texas.

(2) It will yield, with fair treatment, on sand soils, from 4 to 5 tons per acre.

(3) It will give, when properly manufactured, from 20 to 25 per cent. of the weight of the fresh root in starch of high grade.

(4) The starch is naturally in a pure state, and no chemicals of any kind are necessary in its manufacture.

(5) The starch resembles, in its physical properties, that of maize, and can be used as a substitute therefor in all cases.

(6) An excellent article of tapioca can be prepared from the starch of the cassava plant.

(7) Glucose can be prepared directly from the starch, or more profitably from the pulp of the peeled root.

(8) The plant furnishes an excellent human and cattle food, deficient, however, in nitrogen. It would make a well-balanced ration for cattle when mixed with one-fourth its weight of cotton-seed oil-cake.

CHEMISTRY FOR THE PHARMACIST.

By William B. Thompson.

There are many reasons why pharmacists who seek avenues for the application of scientific knowledge should make especial study of the chemistry of agriculture and the chemistry of soils. Soil analysis is wholly within the possibility of scientific investigation. In the growth of plants and trees, soil loses nothing appreciable of its ponderous material. The elementary substances which enter into it are exhausted by absorption and the processes of vegetable growth. Nature has, it is true, her own occult method of supplying these, but art is a most valuable factor in supplementing or aiding the operations of natural causes. Science has done much, and there is yet much to be done, and agriculture much needs the principles and theories of science applied to its practice. Themes for study are to be sought in determining the action of manures and other animal and mineral fertilizers—the terms or periods necessary for the proper recuperation in cleared and open lands, where the chemical elements are only to be derived from the air, artificial treatment not being feasible; the character of sub-soil as it affects top soil; the action of infiltration and absorption; the upward and downward movements of moisture. In cattle manures the important office of the saturating urines, which, by a species of fermentation, gradually develop the ammonias, these, in turn, combining with acids, and thus oxidation forms less volatile and more soluble salts.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Proceedings of the American Pharmaceutical Association at the Forty-second Annual Meeting, Held at Asheville, N. C., September, 1894.

By far the most valuable part of the proceedings of the last meeting is the Report on the Progress of Pharmacy. It constitutes a sort of pharmaceutical encyclopædia for the year from June 30, 1893, to July 1, 1894. The only regret we have in regard to it as a whole, is that it is not usually available to members until some months after it is presented at the meeting. We are not disposed to find fault with the Secretary on this account, as he has no doubt been delayed by others. In selecting a printer, the Secretary or Council should take time into account as well as the lowest bid. While the original communications are not on a par with the above-mentioned report, still there are a few very creditable ones. The great majority, however, had better remained in the hands of the Publishing Committee.

It is to be regretted that one member should load the Proceedings with six communications on queries, some of which could be answered to the satisfaction of every intelligent pharmacist by a simple negative or affirmative.

The Association was also treated to a rather excessive dose of cod-liver oil. The Publishing Committee will make no mistake to let it be known that only papers of merit will be printed.

COD-LIVER OIL AND CHEMISTRY. By F. Peckel Möller, Ph.D., London, and Christiania, Norway, Peter Möller; and can be had from W. H. Schieffelin & Co., New York, and from A. T. Möller & Co., Copenhagen. 1895.

The author apparently does not try to conceal the fact that this large work of something over 600 pages is intended to be indirectly an advertisement. With this knowledge we are still favorably impressed with the book. It gives, in the 100 pages devoted to cod-liver oil, some facts that it will be difficult to controvert; at the same time it is refreshing to read some of the theories advanced in favor of the administration of a pure cod-liver oil. The author relegates nearly all of the "active principles" which have been discovered at one time or another to the category of decomposition products, and we believe he is about right.

PROCEEDINGS OF THE FIFTEENTH ANNUAL MEETING OF THE NORTH CAROLINA PHARMACEUTICAL ASSOCIATION, ASHEVILLE, 1894.

The proceedings of this Association make a creditable showing with four original papers and some other interesting matter, including the Report of the North Carolina Pharmacy Board.

PROCEEDINGS OF THE MICHIGAN STATE PHARMACEUTICAL ASSOCIATION, AT ITS TWELFTH ANNUAL MEETING, HELD AT DETROIT, 1894.

Five original communications have been allowed to appear in the appendix. They are, however, well worth reading, and it is a pity they were given such an inconspicuous position. We have some doubts about the advisability of printing portraits of living members in proceedings of this kind; particularly when, as in this case, one of the former presidents is made to face an advertisement of Duffy's Malt Whisky, another to face Ayers' Remedies, and so on through the list to the end, where we read of "the greatest medical discovery of the age." Are the Michigan pharmacists trying to deplete the coffers of the proprietary manufacturers, that they admit their "display" advertisements?

FORSCHUNGS-BERICHTE ÜBER LEBENSMITTEL UND IHRE BEZIEHUNGEN ZUR HYGIENE, ÜBER FORENSE CHEMIE UND PHARMAKOGNOSIE. Heft 4, 1895.

The most noteworthy and timely article in this issue is concerning "The Action of Formalin on Foods."

ANNUAL REPORT FOR THE YEAR 1894. By E. Merck, Darmstadt.

This report is divided into Original Communications, of which there are six; Preparations, of which a great number of new ones are mentioned; and Drugs.

SKETCHES OF WONDERLAND. By Olin D. Wheeler.

Although the pamphlet is published in the interest of the Northern Pacific Railroad, the illustrations alone are worth the trouble and expense of sending six cents in stamps (to cover postage) to Chas. S. Fee, General Passenger and Ticket Agent N. P. R. R., St. Paul, Minn. It may at the same time be useful to some members of the A. Ph. A. who are going to Denver.

ABSTRACT FROM MINUTES OF MEETING OF MEMBERS OF THE COLLEGE.

MARCH 25, 1895.

The annual meeting of members was held to-day, the unusual number of 38 being present. Charles Bullock presided. Reports of permanent committees and of officers of the College were received at this meeting. Report of editor was made as follows:

During the year there have been published 79 original papers by 40 authors. This number of original contributions has been exceeded but few times in the history of the JOURNAL. Of the authors, 11 were active members of the College, and one, Mr. Hooper, an honorary member residing in India, who contributed two papers. Eleven of the twelve numbers issued were illustrated. The contributions by Professor E. S. Bastin merit special mention, he having furnished 9 papers during the year, all of which were illustrated but one.

Sixty-five reviews and a number of editorials made up the balance of the literary matter.

Although the number of pages in several issues were increased, it was not found possible to publish as many abstracts as desirable.

There was a creditable disposition shown on the part of writers throughout the country to furnish original matter to the JOURNAL, and had it not been for this fact, there would have been a marked decrease in the number of original papers, for the number of contributors among the College membership showed a decided falling off.

It is to be hoped that those who are associated with the College will not forget that much of the advancement of the institution in its early history was due to the scientific character of its members, who were willing to put on record their observations for the benefit of their pharmaceutical brethren.

The Pharmaceutical Meetings are a source of support to the JOURNAL, and it is to be regretted that they have been so poorly attended by members of the College. It has been shown during the present series that valuable papers can be provided for each meeting, but the authors are discouraged by the poor attendance, and consequently the absence of discussion, which materially adds to the value of the contributions.

Mr. Robert England moved that the price of the AMERICAN JOURNAL OF PHARMACY be reduced to subscribers to $2.50 per annum. Motion amended by Mr. Beringer that the subject be referred to the Committee on Publication. Amendment carried. The treasurer of Publication Committee appended supplementary statements to the general report of the editor as usual. The librarian and curator also made their annual statements, the latter asking for an appropriation of $133 to perfect some improvements in the museum appliances. Referred to Board of Trustees with approval. Prof. Remington presented communication having reference to a representation by this College at the sessions of the American Pharmaceutical Association, to be held in Denver, to consider the subject of "a uniform college requirement for graduation." The chairman appointed Prof. Remington to represent this College.

The president appointed Messrs. McIntyre, Cliffe and Prof. Trimble as delegates to the Pennsylvania Pharmaceutical Association, which convenes at Eagle's Mere, Pennsylvania, in June. Mr. Boring called the attention of the

members to what he considered an omission in the financial statement distributed to members, namely, that the gross receipts or income of the College was not given. This subject, with some other allied matters, elicited much discussion, being participated in by Messrs. Boring, Robert England, Buckman, Procter, Remington and Beringer. As a result a motion prevailed to refer the subject to the Board of Trustees for full consideration.

Wallace Procter offered the following resolution:

Resolved, That the Philadelphia College of Pharmacy, desiring to record their appreciation of the interest that has always been evinced by the Alumni Association in all pertaining to the advancement of the College, and especially in view of the handsome contribution of over $1,400 toward the electric light plant just installed, do tender an especial vote of thanks to the Alumni Association of the Philadelphia College of Pharmacy.

A violation of the code of ethics on the part of a member of the College was referred to and facts stated. A committee was appointed to consider the facts and report thereon. The annual election recurring with this date, the following officers and trustees were elected: Charles Bullock, President; Robert Shoemaker, 1st Vice-President; Wm. J. Jenks, 2d Vice-President; James T. Shinn, Treasurer; Dr. A. W. Miller, Corresponding Secretary; Wm. B. Thompson, Recording Secretary; Thos. S. Wiegand, Librarian; Jos. W. England, Curator; Henry Trimble, Editor. Committee on Publication: Henry N. Rittenhouse, Joseph W. England, Saml. P. Sadtler, Wallace Procter, and the Editor. Trustees for three years: Jos. L. Lemberger, Robert England and Saml. P. Sadtler.

Meeting on motion adjourned.

WILLIAM B. THOMPSON, *Secretary.*

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, April 16, 1895.

The meeting was called to order by asking Prof. F. G. Ryan to take the chair.

The following books were stated to have been received and placed in the Library: Report on Education in Alaska, and a Monograph on the Domestication of the Reindeer.

Prof. Trimble showed a specimen of Golden Wattle Bark, *Acacia pycnantha*, containing 35 per cent. of tannin, another specimen of the same species assaying from 40 to 42 per cent. of tannin, and said to be the best bark; also a specimen of Sydney Wattle Bark, *Acacia decurrens*, containing 35 per cent. of tannin. The barks had been presented by Mr. J. H. Maiden, of Sydney, New South Wales.

The same gentleman also showed a variety of kino derived from *Eucalyptus calophylla*, R. Brown.

The specimen had been collected in West Australia, and donated by Baron F. von Mueller.

The Actuary was instructed to send the thanks of the College both to Mr. Maiden and Baron F. von Mueller.

Mr. F. W. Haussmann read a paper on Fluid Extracts, which elicited considerable discussion. Glucose had been found in some of the fluid extracts

examined. Its addition, with a view of giving them consistence and of adulterating them, was commented on.

Prof. Ryan pointed to the fact that the small amounts found would not afford enough profit to cause the use of glucose by manufacturers.

Some of the pharmacists present suggested the drug itself to have been the source of the glucose found.

Prof. Trimble was of the opinion that in some cases it might have been introduced through the use of glycerin containing it.

Query was made whether or not the fluid extracts produced by the large manufacturers are official as regards the exact process of preparation given by the Pharmacopœia.

Prof. Ryan stated that the manufacturers often find the pharmacopœial directions poorly adapted to the preparation of these products on a large scale but that, having selected a menstruum and formulated a method through experience, they can produce fluid extracts of uniform and full official strength.

It was remarked that these manufacturers would be glad to advise with the committees charged with the construction of the formulas of the Pharmacopœia.

Mr. L. P. Kebler spoke of some experiments on opium assaying. Some samples of opium which were quite curious were exhibited. One of the samples had a strong odor of coffee and assayed 15 per cent. of morphine. Mr. Kebler also presented a paper on Black Sulphur, a topic that had been discussed at the last meeting, and upon which he had been asked to report.

On motion, the papers were referred to the Publishing Committee and an adjournment ordered.

T. S. WIEGAND, *Registrar.*

A GENERAL INVITATION TO THE MEMBERS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

Members interested in commercial and allied subjects are respectfully invited to write papers for our next meeting, to be held on August 14th, at Denver, Colorado.

As income and revenue derived from the practice of pharmacy is, beyond dispute, the most important factor involved in the pursuit of our material affairs, I hope that hundreds who will be unable to attend the above convention, will favor the commercial section with their views on an impending crisis.

I particularly request the Chairmen of Committees on Trade Interests in every organized State Association to favor me with their existing grievances and problems, to be solved in the interests of the common welfare of our brethren. Many able members whom I approached at Asheville, and suggested that they enlist themselves among writers on commercial subjects, surprisingly responded: What shall I write on? In order to promote the desideratum I take great pleasure in suggesting the following queries:

(1) Where is the practice of pharmacy drifting?

(2) To what cause is failure due, in attempting to protect our mutual trade interests?

(3) Why do a large number of wholesale druggists supply department stores

with drugs and medicine, and violate contract agreements on rebate goods with manufacturers of proprietary medicines?

(4) Under what circumstances is substitution admissible?

(5) Is the protection of the trade interest of the druggists and chemists by the manufacturer of proprietary goods a possibility?

(6) Is general substitution justifiable?

(7) Is it justifiable to purchase unreliable materials for the purpose of increasing profits, thereby injuring the reputation of the physician, and endangering the patient's chance of recovery?

(8) Are non-secret preparations, in imitation of well-known domestic medicines, a legitimate product, and is it honest for a dealer to allow his name to be printed on the label so as to give an unknown compound currency, when he is ignorant of the contents of such preparation?

(9) Does not the pharmacist jeopardize his reputation and standing by dealing in non-secrets, when he possesses the knowledge of compounding as good or better formula?

(10) Does it pay pharmacists to substitute?

(11) Is the claim true, that physicians dispense their own medicines on the ground that pharmacists use inferior materials in their prescriptions?

(12) Where reputable pharmacists discover goods falsely labelled and below pharmacopœial standards, is it not their duty to expose such dishonesty?

(13) Has excessive competition introduced a "cheap era" into the drug trade?

(14) Why are physicians' supply establishments making inroads on the business of the pharmacist?

(15) What are the chief arguments employed to induce physicians to supply ready-made medicines to their patients?

(16) Where is the practice of medicine drifting?

(17) If the future facilitates the art of dispensing by physicians, what is our remedy?

(18) Is it not our duty to demand protection from the physician and make an effort to fuse our natural relationship by a just compromise?

(19) What argument have we against those who advocate that the day has arrived when any person, with open store for the sale of merchandise, will have the right to sell his goods to any other person who comes with money in hand and demands same, irrespective of his calling or profession?

There is no hypothetical sensationalism in my queries, and I might add a few more sure to present themselves in the future, but we will await developments. There are questions that confront us daily—a revolution in our ranks is imminent. What shall we do about it? Shall we submit to the situation like slaves? Never! Let us get together at Denver and act, not like flustered and unsympathetic brethren, but like men willing to battle for justice and our rights. It is high time to cry halt.

Address all papers and communications to

Very truly yours,

GEORGE J. SEABURY,

Chairman of Commercial Section, A.Ph.A.

EXAMINATION QUESTIONS OF THE PHILADELPHIA COLLEGE OF PHARMACY.

Junior Examination.—The examinations of the Junior students during the past term were on the following subjects:

FIRST JUNIOR EXAMINATION.

PHARMACY.

A—(1) Write a short composition on the Metric System, giving as complete an account as you are able to, upon half a page of the examination paper. (2) Give the equivalents of the following metric quantities in ordinary or old form weights and measures: 5 Kg.; 1774·4 c.c.; 29·573 c.c.; ½ grain; $\frac{1}{10}$ grain. (3) How many grains are there in a fluid ounce of water at 15·6 C. (60° F.); in an imperial fluid ounce of water; in an avoirdupois ounce; in a troy ounce?

B—Define vaporization, evaporation, and distillation, and state the principle which governs the rapidity of the evaporation of liquids at or above the boiling point and below the boiling point.

CHEMISTRY.

C—(1) Define the term specific gravity—as applied to solids and liquids. (2) Give two methods for the determination of the specific gravity of a solid. Two methods for the specific gravity of a liquid.

D—(1) What is meant by "latent heat of fusion?" Give an example of practical utilization of this principle. (2) What effect has pressure upon the boiling point of a liquid? Give an example of a practical utilization of boiling under reduced pressure.

BOTANY

E—Roots. (1) Define an adventitious root. (2) Name a common plant that bears adventitious roots. (3) In what group of plants are the roots destitute of a radial structure? (4) In what group of plants do we usually find stems, leaves and hairs, but no roots? (5) What are the chief uses of roots?

F—Stems. (6) What names are applied respectively to such a stem as the potato, to the flowering stem of the dandelion, and to the scaly unbranching stem of the palm? (7) In what groups of plants do we find a cambium zone in the stem? (8) What organs of vegetation are necessarily present in a bulb? (9) What is a supernumerary bud? (10) Define a scandent stem.

SECOND JUNIOR EXAMINATION.

PHARMACY.

A—(1) In what respects does colation differ from filtration? Describe the methods and materials employed by pharmacists in both processes. (2) How are mixtures of oil and water separated? Draw a sketch illustrating the apparatus used in the separation.

B—Crystallization. (1) What is the object of requiring *perfect rest* for solutions designed for crystallization, and why are such solutions sometimes agitated during the cooling process? (2) Of what use are nuclei in effecting crystallization? (3) What is water of crystallization? (4) Define efflorescence and deliquescence.

CHEMISTRY.

C—(1) State the difference between a binary and a ternary molecule, and give examples of each. (2) What is a haloid acid? An oxygen acid? Give examples of each. (3) Write in symbols the formulas of the following: Potassium bromide, magnesium oxide, mercurous chloride, mercuric chloride, carbon disulphide, phosphorous trichloride, hypochlorous oxide, sulphuric acid.

D—(1) Write two reactions for the preparation of hydrogen. (2) Upon what does the reducing action of hydrogen depend? (3) Mention illustrations of the affinity of chlorine for hydrogen.

BOTANY.

E—The Stem. (1) Draw a diagram of a cross-section of a dicotyl stem, and that of a cross section of a monocotyl stem. (2) Name the different kinds of buds a stem may bear. (3) Name the different kinds of underground stems that plants may produce. (4) State the distinction between a stem and a thallus. (5) In what two principal ways may stems branch?

F—Leaves. (6) Draw a diagram of circinate prefoliation. (7) How many orthostachies on a stem when the phyllotaxy is ⅜? (8) The first two members of a series in alternate phyllotaxy being ½ and ⅓, what would the seventh member be? (9) A certain leaf is described as follows: Petiolate, exstipulate, general outline of lamina ovate, apex mucronate, margin serrate, venation pinni-furcate. Draw such a leaf. (10) What is the chief use of an ordinary or foliage leaf?

FINAL JUNIOR EXAMINATION.

PHARMACY.

A—Extracts. (1) Define extracts. (2) Name six classes of extracts. (3) What are "Succi Spissati?" (4) Give a general process for their preparation. (5) Describe Prof. Herrara's method of making extracts, and state the theory upon which it depends. (6) What proximate principles are usually found in extracts? (7) What class of principles are best extracted by strong alcohol? (8) What class of principles are best extracted by water? (9) Is diluted alcohol a good solvent for extracts? *Give reasons* for your answer. (10) What influence has the choice of the menstruum on the yield of most extracts?

B—(1) What are scaled salts? How are they prepared? (2) Are they usually definite chemical salts, or are they of varying molecular composition? (3) Does reduced iron belong to this class? (4) What is the present official name of reduced iron? What was its former official name? Under what other name is it known in commerce? (5) Describe the method of making reduced iron, illustrating the process by a drawing. (6) What precautions are necessary to prevent the very freshly-made powder from spontaneously igniting? (7) When a dose of reduced iron is administered and eructations of hydrogen sulphide ensue, what is the usual cause of the unpleasant experience? (8) How may the evolution of hydrogen sulphide be prevented? (9) How may the quality of reduced iron be tested? (10) What is its dose?

CHEMISTRY.

C—(1) Give the formula for ammonia. State its sources and methods for its production. (2) Describe the physical and chemical properties of ammonia, and state what are its most important uses at present. (3) How does

ammonia react with hydrochloric, nitric and sulphuric acids? Give the formulas and chemical names of the products in these three cases.

D—(1) Complete the reactions: $Na_2S_2O_3 + 2HCl =$; $Ca_3(PO_4)_2 + 2H_2SO_4 =$; $Ca_3(PO_4)_2 + 3H_2SO_4 =$.

(2) Give the chemical formulas for boric acid, official sodium borate, orthophosphoric acid, official sodium phosphate.

BOTANY AND MATERIA MEDICA.

E—Organs of Vegetation. (1) Name in the order of their evolution the organs of vegetation of the higher plants. (2) How would you distinguish between a tuber and a tuberous root? (3) State the distinction between a cladophyll and a phyllode. (4) Make a drawing of a single leaf that answers the following description: exstipulate, petiolate, lamina 2 inches long, obcordate, crenulate, and with a pinni-furcate venation. (5) Write the pharmacal name of the drug derived from Barosma betulina, and state three of the most important of the structural characteristics of the drug.

F—Organs of reproduction. (6) What organs of the complete flower are essential to the production of seed? State the respective functions of these organs. (7) Draw the ground plan of a typical flower of a monocotyl in which the anthers are bilocular and extrorse and the single compound ovary has marginal placentæ. (8) State the most distinctive difference between the flower of an angiosperm and that of a gymnosperm. (9) Write the appropriate names of each of the following fruits: a pineapple, a grape, a black pepper, a colocynth, and a juniper fruit. (10) Draw a diagram of a complete dicotyledonous embryo, pointing out and correctly naming each of its parts.

COMMITTEE.

G—Diluted Hydrobromic Acid. (1) What is its official name? (2) What is its percentage strength? (3) Give a process for its manufacture. (4) What is its specific gravity? Should it be completely volatilized by heat? and why? (5) What are its medicinal properties and dose?

H—Describe the following classes of official preparations. Give the official title and mode of preparation of one of each class. (1) Mucilages. (2) Emulsions. (3) Mixtures. (4) Infusions. (5) Glycerites.

I—A pharmacist made a compound mustard liniment by mixing 3 per cent. of volatile oil of mustard, 20 per cent. of fluid extract of mezereum, 10 per cent. of oil of camphor, 15 per cent. of castor oil, with sufficient alcohol to make ten litres. How many c.c. of each ingredient did he use? (Percentage by measure being understood without allowance for contraction.) How many bottles, each to contain 500 grams of the liniment, would this quantity fill if its specific gravity was 0·850?

K—What antidotes should be administered at once for poisonous doses of —(1) Corrosive sublimate. (2) Ammonia water. (3) State how you would prepare an emergency antidote for arsenous acid. (4) What precautions are necessary in administering antidotes?

OPERATIVE PHARMACY.

The Junior Examination in Operative Pharmacy was held on Saturday, March 2, 1895. The work exacted was the making of solution of ferric sulphate, mass of mercury, and granulated sodium acetate.

PHARMACOGNOSY.

The Junior Examination in Pharmacognosy was held on Saturday, March 9, 1895. The students were divided into three sections. Numbered specimens of drugs were given them for examination, and they were required to answer the following questions:

QUESTION 1.

A—(1) Rhizome or root? (2) Monocotyl or dicotyl? (3) Official name of drug? (4) What test applied for starch? (5) Result of test for starch? (6) What test applied for tannin? (7) Result of test for tannin?

B—Draw diagram of cross-section at least twice natural size, and point out the following parts: (1) Meditullium. (2) Cambium zone (if present). (3) A medullary ray (if present). (4) The endophloeum (if present). (5) The pith (if present).

QUESTION 2.

A—Describe leaf or leaflet, with reference to the following points: (1) General outline. (2) Base. (3) Apex. (4) Margin. (5) Upper surface. (6) Under surface. (7) Texture. (8) Venation.

B—Make drawing of leaf or leaflet, writing underneath it the botanical name of the plant and the official name of the drug. Also point out in the drawing: (1) The petiole or the petiolule (if present). (2) One of the stipules (if stipules are present). (3) The midrib of a lamina (if a midrib is present).

QUESTION 3.

A—The Flower. (In describing it, use the appropriate botanical terms). (1) Kinds of organs present? (2) Numerical plan? (3) Symmetry? (4) Regularity? (5) Insertion (*a*) of calyx; (*b*) of corolla; (*c*) of stamens? (6) Cohesion (*a*) of calyx; (*b*) of corolla; (*c*) of stamens; (*d*) of pistils?

B—Draw a diagram of the ground plan of the flower, indicating the correct number and relation of parts, the number of lobes of the anthers, the direction in which the anthers face, and the placentation of the ovary.

QUESTION 4.

A—The Fruit. (1) Apocarpous or syncarpous? (2) If syncarpous, number of carpels? (3) Inferior or superior? (4) If dehiscent, the mode of dehiscence? (5) Placentation? (6) Simple, aggregated, or multiple? (7) Proper name of fruit?

B—Draw diagram of cross-section of fruit, showing number of loculi, mode of placentation, and point out a false partition, if any false partitions are present.

QUESTION 5.

A—The Seed. (1) Atropous, anatropous, campylotropous or amphitropous? (2) Texture of testa? (3) Albuminous or exalbuminous? (4) Texture of albumin, if albumin is present? (5) Does the kernel of the seed possess starch? (6) Embryo monocotyledonous, dicotyledonous, or polycotyledonous?

B—Draw a diagram of the vertical section of the seed, and point out such of the following parts as are present: (1) Hilum. (2) Micropyle. (3) Chalaza. (4) Raphe. (5) Albumen. (6) Embryo.

The specimens in each section were as follows:

First Section.	*Second Section.*	*Third Section.*
Root: Taraxacum.	Pyrethrum.	Podophyllum.
Leaf: Uva Ursi.	Gaultheria.	Buchu.
Flower: Azalea.	Viola Tricolor.	Tulip.
Fruit: Illicium.	Poppy Capsule.	Cardamom.
Seed: Amygdala Amar.	Castor Bean.	Pepo.

Senior Examination—The examination of the senior class for the degree of Graduate in Pharmacy commenced with that in Operative Pharmacy on Saturday, March 23d. On Monday, the 25th, the one on Analytical Chemistry was held, followed by the written examinations in the other branches. The following are the questions:

THEORY AND PRACTICE OF PHARMACY.

A—Opium. (1) Can the value of opium be judged by its physical properties? (2) What reliable methods are employed to ascertain its value? (3) What is the average difference in strength between opium and powdered opium? (4) In what proportions may four quantities of powdered opium containing respectively 7, 8, 16 and 18 per cent. of morphine, be mixed so that the mixture shall contain 14 per cent. of morphine?

B—Give the synonym, unabbreviated official or Latin name, ingredients, brief outline of process, and describe the appearance of: (1) Mitigated caustic. (2) Yellow mercurous iodide. (3) Milk of asafœtida. (4) Hoffmann's anodyne. (5) Spirit of glonoin. (6) Chloroform liniment. (7) Tincture of strophanthus. (8) Elixir of vitriol.

C—Give the official name, English name, ingredients, brief outline of process, and describe the appearance of: (1) Liquor magnesii citratis. (2) Syrupus picis liquidæ. (3) Spiritus ammoniæ aromaticus. (4) Syrupus rhei. (5) Tinctura veratri viridis. (6) Pilulæ ferri carbonatis. (7) Unguentum iodi. (8) Emplastrum ammoniaci cum hydrargyro.

D—(1) How is salicylic acid made? (2) What is the principal objection to prescribing it in simple aqueous solution? (3) Name three official salts of the acid. (4) What official liquid is made from the acid? (5) Describe the physical properties of this liquid. (6) Give the official name of the salicylic ether of phenol. (7) Describe its appearance and physical properties. (8) What are its medical properties? (9) What is its dose? (10) How is it usually administered?

E—(1) How is turpentine obtained? (2) Describe its appearance. (3) What commercial products are obtained by distilling it? (4) What products are obtained by distilling the results of the distillation? (5) What is terebene? (6) How is it made? (7) What is its dose? (8) How is it best administered?

F—(1) How is aloe purificata made? (2) Name seven official preparations (giving full official titles) into which it enters. (3) What is the active principle of each official aloes? (4) How may they be distinguished from each other by a chemical test?

G—(1) In compounding prescriptions, state under what circumstances it is advantageous to aid the solution of a solid by heating it with the solvent. (2) State when it is proper to filter a prescribed liquid preparation, and explain why, for certain reasons, filtration sometimes should not be resorted to. (3)

When is it permissible to make an addition to a prescription without the consent of the prescriber? Give reasons for your answer. (4) Is it desirable, when renewing a prescription, to follow the order of mixing the ingredients originally used? If so, why?

H—Pills. (1) What physical properties are essentially required in forming a good pill mass? (2) Give reasons for each requirement. (3) What is a pill excipient? (4) Give reasons (and illustrate by a practical example) for selecting either of the following excipients: water, syrup of acacia, glycerin, glucose, soap, confection of rose.

I—Criticise and translate the following prescriptions. Write out the English names of each ingredient, with quantities. State how you would compound each, and if any incompatibility would be developed in either, state what it is, and what would be the proper procedure:

℞ Hyd. Bichlor., gr. j.
Pot. Iod.
Fer. et Am. Cit., āā ʒiij.
Tinct. Cinch. Co., fʒiss.
M. ft. Sumat drachmam ter in die. S.

℞ Ext. Secale Cornut. Fld., fʒi.
Vin. Ejusdem, fʒi.
Sacch. Alb., ʒss.
M. S.—One teaspoonful every two or four hours, as needed. C.

K—Criticise and translate the following prescriptions. Write out, with English names, the ingredients and quantities. State whether you would compound them as written, or what course you would pursue upon receiving them:

℞ Mist. Digitalis Comp., fʒij.
Tinct. Gentian Comp.
Tinct. Cinchon. Comp., āā fʒi.
Morph. Sulphat., gr. x.
M. S.—Two teaspoonfuls three times a day (in water).

℞ Colchicine.
Aconitine.
Emetine.
Sulph. Calcium, āā gr. x.
M. ft. in Caps., No. x. Sig.—One every three hours.

CHEMISTRY.

A—(1) Give the official name and chemical formula for nitre. (2) State the sources of nitre, and describe how it is made commercially. (3) State the physical and chemical characters and tests by which nitre can be recognized. (4) Give the uses of nitre, whether in medicine, in the arts, or for general purposes.

B—(1) Give the proper chemical name and formula of *sodii hyposulphis.* (2) How is the salt made commercially? (3) State the physical and chemical tests by which it can be distinguished from *sodii sulphis.* (4) What are the most important applications of this compound?

C—(1) Describe the occurrence of the element copper, mentioning its most important minerals. (2) Describe the metal and note its most important physical and chemical characters. (3) Mention the most important alloys of copper, stating their several components. (4) What is the composition of the several green copper pigments? (5) What is the effect of adding ammonia to a solution of a copper salt?

D—(1) Describe the metal bismuth. (2) Give the formulas of bismuth chloride, of bismuth oxychloride, of the normal nitrate, of *bismuthi subnitras* and of *bismuthi subcarbonas*. (3) Mention some of the alloys of bismuth, and state their character and uses. (4) How is bismuth distinguished in the course of qualitative analysis?

E—(1) State the formula of *acidum chromicum* and give its proper chemical name. (2) Write the reaction for its production. (3) Give the formulas of potassium chromate and potassium dichromate respectively, and state what physical and chemical differences in properties exist. (4) Give the formula of "chrome alum," and describe it.

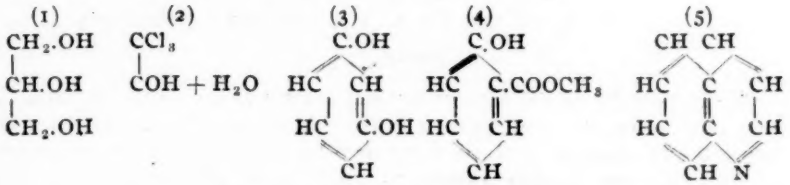
F—(1) Give the exact chemical name and formula for chloroform. (2) From what several sources is it obtained? (3) Explain the production in each case by the use of reactions. (4) Describe chloroform, and give the pharmacopœial test for its purity.

G—(1) To what chemical class do the fatty oils belong? (2) Mention the proximate constituents usually contained in them. (3) Write several reactions for the decomposition of these proximate constituents. (4) Enumerate official compounds which are obtained as the result of these reactions. (5) State what technically important industries are based on these reactions.

H—(1) Give the exact chemical name and graphic formula of aniline. (2) Show by reactions how it is derived from benzene. (3) How is *acetanilidum* made? (4) What are its physical, chemical and therapeutic properties? (5) Write the graphic formula of para-bromacetanilid and methylacetanilid.

I—(1) What is a terpene, and what are the most characteristic reactions of this class of bodies? (2) What is a camphor? What classes of chemical compounds are included under this name? (3) What are essential oils, and what is their general chemical composition? (4) How are the resins related to the preceding classes of compounds? (5) Into what groups may the resins be divided?

K—Give the correct chemical names for the following:



MATERIA MEDICA AND BOTANY.

I—Botany. (1) Name three proteids different from ordinary protoplasm that frequently occur in vegetable cells. (2) Classify and name the different varieties of vasal bundles that occur in plants. (3) What is the essential tissue of phloem and what is the essential tissue of xylem? (4) State the two most

important uses of vasal bundles. (5) Name the variety of bundle that is the most common respectively in roots, in the stems of Pteridophyta, in the stems of pines, and in leaves. (6) In what natural order of plants may we look for stems having bi-collateral bundles? (7) Name the series and class to which each of the following plants belong: Bacillus tuberculosis, Cetraria Islandica, Claviceps purpurea, Lycopodium clavatum, and Chenopodium ambrosioides.

II—Materia Medica. (8) How do the drugs calamus and podophyllum differ (*a*) in the kind, and (*b*) in the distribution of their vasal-bundles? Explain by aid of diagrams. (9) What acrid rhizome-and-root drug is easily distinguished from other official drugs by the conspicuously 4-rayed (or rarely 3- or 5-rayed) meditullium of its roots? (10) What two bark drugs are readily distinguishable from other official barks by the fact that solutions of the caustic alkalies turn them a deep red? (11) Write the pharmacal names of three official leaf-drugs which are characterized by the possession of internal glands which cause them to appear pellucid-punctate when held up to the light. (12) Name three official drugs, each powerfully sialagogue, one a leaf-drug, one a bark-drug and the other a root-drug. (13) Name a bark-drug, a root drug, and a seed-drug, each official and each derived from the natural order Apocynaceæ. (14) Write the botanical names and natural orders of the plants furnishing the following drugs: cloves, wild cherry, and prickly ash. (15) By means of what chemical test may guaiac wood be easily distinguished from other medicinal woods? (16) State the botanical origin of each of the following: coca, cacao and cocoanut oil. (17) Name one example each of official vegetable drugs, chiefly valuable for the following properties: refrigerant, antispasmodic, analgesic, and myotic. (18) Name the official drugs which are the sources of the following active principles: eserine, thebaine, allyl sulphocyanide, veratrine, and brucine. (19) Name three mydriatic alkaloids. (20) Name two drugs which powerfully antagonize each other in the effects they have upon the glands of the skin, one promoting diaphoresis, the other diminishing it. (21) Name a drug that is used as a physiological antidote in opium poisoning. (22) Name a diuretic drug that produces diuresis indirectly by raising the blood pressure. (23) Name one emetic drug that produces emesis by direct action on the vomiting centre in the medulla, and another that produces it by direct action on the stomach. (24) Name three cholagogue cathartic drugs of vegetable origin. (25) Name three hydragogue cathartic drugs of vegetable origin.

COMMITTEE.

A—A druggist made a dentifrice from the following ingredients:

15	pounds powdered orris root	@	$0.40	per pound.
5½	" " cuttle fish . . .	@	.30	" "
10	" " myrrh	@	.50	" "
413	grains otto of rose	@	8.75	per ounce.
7	ounces 24½ grains French carmine	@	10.00	per kilogram.
Sufficient precipitated chalk		@	.06	per pound to make 100 pounds.

What would the whole quantity cost?

What percentage of profit would he make if he sold it at 80 cents per pound (no charge being included for labor or time)?

Show all figures used in obtaining your answer on this sheet of paper.

B—Pepsin. (1) Give the official name of pepsin. (2) What is the official description? (3) Is it a chemical compound? (4) What are its medical uses? (5) How is its value estimated? (6) Describe a process for making scale pepsin.

C—Silver. (1) How does silver usually occur in nature? (2) Give its symbol and atomic weight. (3) Give its specific gravity. (4) Describe two tests for silver salts. (5) Name six official preparations of silver. (6) How may its oxygen compound be prepared? (7) What official precautions should be observed in dispensing this substance?

D—Massa Hydrargyri. (1) What ingredients are used in preparing it? (2) What percentage of metal does it contain? (3) Give the common names for this preparation. (4) Why is long-continued trituration necessary? (5) Give a test for absence of mercuric oxide. (6) Give a test for limit of mercurous oxide. (7) What are its medical properties? (8) What is its dose?

E—Spanish Flies. (1) Give the official title, the Latin name of the insect and the order to which it belongs. (2) Give the commercial sources of this drug. (3) Which flies are most highly esteemed, and how may they be recognized? (4) Give the name of the vesticating principle. What is its best solvent? (5) Give a process for obtaining this principle. What is the usual percentage of it in Spanish flies? (6) Name the official preparations of Spanish flies, and give the ingredients of each. (7) What are the medical properties and dose of Spanish flies? (8) How does the official process for blistering cerate differ from that of the previous Pharmacopœia?

F—Potassium Hydrate. (1) Give a method of preparing potassium hydrate. (2) In what form does it usually occur in the shops? (3) Describe (*a*) the physical and (*b*) the chemical properties of the official compound. (4) What impurities are liable to be present? (5) What is the quantitative method of determining its value. (6) Give four reagents for the detection of potassium salts.

G—(1) How would you distinguish a root-drug from a rhizome-drug. (2) Write the pharmacal names of two root-drugs which possess laticiferous tissue. (3) Write the pharmacal name of a monocotyl rhizome-drug that contains oleoresin cells. (4) Write the pharmacal names of two drugs, one a root-drug and the other a bark-drug, each of which contains mucilage cells. (5) Write the name of the most potent principle in each of the following drugs: Digitalis, veratrum viride and jaborandi. (6) Name three poisonous alkaloids, one derived from a root-drug, one from a leaf-drug and the other from a seed-drug. (7) Name a fruit drug, which, on pulverization and treatment with solution of potassium hydrate, emits a volatile alkaloid which has an odor similar to that of mice. (8) Name a bark-drug from which, on heating in a test tube, there is distilled a purple liquid that accumulates in droplets on the cooler portions of the tube. (9) Name two official drugs, both of which, in medicinal doses, slow the heart's action, but one strengthens it, while the other greatly depresses it. (10) Name a cholagogue bark-drug and a cholagogue rhizome-drug.

H—Iron. (1) What two well-defined series of compounds does this metal form? (2) State the valence of each series. (3) How is reduced iron made? (4) What compounds of iron with the halogens are official? (5) What three forms of ferrous sulphate are official? (6) What iron salt is contained in "Liquor Ferri Tersulphatis?" (7) How does "Monsel's Solution" differ in the character of its iron compound from "Liquor Ferri Tersulphatis?"

(8) In the making of the official solution of ferric chloride, how is the acidulated solution of the ferrous chloride oxidized, and what is the special order of mixing the acidulated solution and the oxidizing agent? Is the former added to the latter or the reverse, and why?

I—Give the official title, botanical name of plant, natural order, habitat and active principle of each of the following drugs: (1) Aconite. (2) Deadly nightshade. (3) Yerba Santa. (4) Hops. (5) Calabar bean.

K—(1) Write a prescription for a 100 c.c. solution to contain chloral hydrate, hyoscine hydrobromate and sodium bromide, with a proper adjuvant and vehicle; adjust the doses for a soporific for an adult patient; express the quantities metrically, and use the unabbreviated official names of the ingredients. Let the signa be: Take 4 c.c. at bedtime; repeat in two hours if necessary.

SPECIMENS.

The following specimens were placed before the students for identification during the respective examinations:

Pharmacy.

(1) Glycerinum. (2) Aqua camphoræ. (3) Emulsum chloroformi. (4) Ceratum cantharidis. (5) Pulvis cretæ compositus. (6) Pulvis glycyrrhizæ compositus. (7) Spiritus juniperi compositus. (8) Extractum ergotæ fluidum. (9) Tinctura calumbæ. (10) Tinctura gentianæ composita.

Chemistry.

(1) Aqua. (2) Sulphur sublimatum. (3) Amylum. (4) Ammonii carbonas. (5) Magnesii carbonas. (6) Acidum boricum. (7) Acidum gallicum. (8) Acidum tartaricum. (9) Plumbi acetas. (10) Benzinum.

Materia Medica.

(1) Senega. (2) Pyrethrum. (3) Iris. (4) Convallaria. (5) Viburnum opulus. (6) Mezereum. (7) Pilocarpus. (8) Santonica. (9) Anisum. (10) Stramonii semen.

Committee.

(1) Terebinthina. (2) Inula. (3) Carum. (4) Potassii carbonas. (5) Acidum boricum. (6) Acidum benzoicum. (7) Liquor ammonii acetatis. (8) Oleum picis liquidæ. (9) Pulvis rhei compositus. (10) Tinctura cardamomi composita.

OPERATIVE PHARMACY.

Write your name and examination number on each label. Restore all containers to their proper places before leaving. Articles marked with an asterisk (*) are weighed.

(*1*) *Syrup of Ferrous Iodide.*

Iron Wire,	2·5	gm.
*Iodine,	8·3	gm.
Water,	15	c.c.
Syrup, q. s.	75	c.c.

Make Syrup of Ferrous Iodide, U. S. P.

N. B.—The syrup for the above should be made by the following formula:

*Sugar,	64	gm.
Water, q. s.,	75	c.c.

Make syrup.

(2) *Ointment of Mercuric Nitrate.*

*Mercury,	2·5	gm.
Nitric Acid,	2	c.c.
Nitric Acid,	3	c.c.
Lard Oil,	30	c.c.

Make Ointment of Mercuric Nitrate by the official process.

(3) *Pills.*

Ferrous Sulphate,	4	gm.
Potassium Carbonate,	2	gm.
Sugar, powd.,	1	gm.
Tragacanth,	·25	gm.
Althæa, powd.,	·25	gm.
Glycerin,		
Water, āā,	3	drops.

Make 25 pills; coat with silver.

N. B.—The silver leaf will be found in the pill-box.

(4) *Powders.*

Cinchonine Sulph.,	3·5	gm.
Glycyrrhiza, powd.,	1	gm.

Mix; make 12 powders.

(5) *Suppositories.*

Alc. Ext. of Belladonna leaves,	·50	gm.
Tannic Acid,	·50	gm.
Oil of Theobroma,	6	gm.

Make 6 suppositories, by rolling.

ANALYTICAL CHEMISTRY.

The examination in this branch consisted in submitting to each student a mixture of three, four or five salts, to analyze qualitatively. The time allowed was two hours.

MICROSCOPY.

Part 1.—From the stem given you for study, first prepare several thin transverse, longitudinal-radial and longitudinal-tangential sections, placing some of each kind in water and the rest in alcohol until required for use. Then proceed to the study of the sections, applying such reagents or stains as are necessary to enable you to answer the following questions:

(1) Is the stem that of a fern, that of a monocotyl, that of a gymnosperm, or that of a dicotyl? State reasons for your conclusion. (2) If vasal bundles are present, to what type and variety do they belong? (3) What lignified tissues are present in the area enclosed by the cambium zone? (4) What lignified tissues occur in the area exterior to the cambium zone? (5) What layers of the bark are present in this stem? (6) Of how many rows of cells are the medullary rays composed? (7) Is starch present? What test did you apply to determine? (8) What kinds of secretion-sacs, if any, are present? (9) Is collenchyma present? If so, in what part of the stem does it occur, and how does it differ from parenchyma? (10) What reagent could you use that would stain the cellulose membranes blue or purple and the lignified and cutinized ones brown or yellowish-brown?

Part 2.—Draw, under a magnification of seventy-five diameters or upward, a wedge-shaped segment, including about one-sixth of the cross-section and extending from the periphery to the centre of the section. Then, by means of index lines, point out such of the following parts as are present:

(1) A parenchyma cell. (2) The area in which sieve tissues occur. (3) A stone cell. (4) Some meristem tissue. (5) A duct in the xylem of a bundle.

SEVENTY-FOURTH ANNUAL COMMENCEMENT.

The exercises connected with conferring the degree of Graduate in Pharmacy were held at the Academy of Music, Wednesday evening, April 17th, at 8 o'clock.

President Charles Bullock conferred the degree upon the following:

Name.	*Subject.*	*State.*
Aley, Hamilton, Jr.,	*Spiritus ammoniæ aromaticus,*	New York.
Anewalt, Ellsworth Quincy,	*Sambucus Canadensis,*	Pennsylvania.
Bacon, Edwin Gray,	*Gum arabic,*	New Jersey.
Baddour, Joseph Selim,	*Tobacco,*	Syria.
Bailey, John,	*Opium,*	Delaware.
Ball, William Ernest,	*Saw palmetto,*	Pennsylvania.
Barnitz, Harry L.,	*Old remedy,*	Pennsylvania.
Barr, Elwyn Paul,	*Prunus Virginiana,*	Pennsylvania.
Binns, Harry R.,	*Oleum ricini,*	Pennsylvania.
Blair, Charles Lee,	*Tincture of myrrh,*	Pennsylvania.
Boyd, Roger,	*Aspidosperma,*	Georgia.
Brendel, Frederick Charles,	*Organic chemistry,*	Ohio.
Branin, Fred. Winston,	*Zingiber officinale,*	New Jersey.
Brockman, Frank William,	*Benzoin,*	Pennsylvania.
Brooks, Joseph Warren,	*Permanganate of Potassium,*	New Jersey.
Brunhouse, Frederick, Jr.,	*Sulphur sublimatum,*	Pennsylvania.
Brunier, George Franklin,	*Glycerin,*	Pennsylvania.
Bucher, William Lewis,	*Strophanthus,*	Pennsylvania.
Bundy, Clinton Thomas,	*Belladonna,*	Ohio.
Cain, Maude Florence,	*Lanolin,*	Pennsylvania.
Campbell, Andrew,	*Liquor potassii arsenitis,*	Pennsylvania.
Campbell, Thos. P. V.	*Preservation of medicines,*	Pennsylvania.
Carpenter, Edward Albert,	*Pills,*	Texas.
Carter, Charles Franklin,	*Syrupus ferri iodidi,*	Ohio.
Cavanaugh, Chas. Joseph,	*Emulsions,*	Pennsylvania.
Chatham, John Eliason,	*Kola nut,*	Pennsylvania.
Coffey, Maurice Grant,	*Successful Pharmacist,*	Pennsylvania.
Colsten, George Henry,	*Camphora,*	Pennsylvania.
Conard, Norman Shoemaker,	*Digitalis and strophanthus,*	Pennsylvania.
Conrey, Henry Slicer,	*Coca,*	Maryland.
Coppenhaver, Chas. Brewster,	*Pilocarpus,*	Pennsylvania.
Davies, William Richard,	*Kola acuminata,*	Pennsylvania.
Davis, Robert Goode,	*Ginger,*	Arkansas.
Dean, Guy Stewart,	*Eucalyptus,*	Ohio.

Name.	*Subject.*	*State.*
Durand, Arthur John,	*Pharmacy vs. tablet triturates,*	New Jersey.
Durbin, John George,	*Syrupus acidi hydriodici,*	Pennsylvania.
Eberly, David Alexander,	*Ancient history of pharmacy,*	Pennsylvania.
Ellis, David,	*Menthol,*	Pennsylvania.
Farnsworth, Anthony,	*Fucus vesiculosus,*	Pennsylvania.
Faunce, Benjamin Rice,	*Cocillana,*	Pennsylvania.
Fisher, Edmund Keim,	*Menthol,*	Pennsylvania.
Flitcraft, Warren Whitney,	*Cochineal,*	New Jersey.
Foresman, Harry Bastian,	*Acetic acid as an extractive,*	Pennsylvania.
Freethy, Charles Henry,	*Medicated wines,*	Pennsylvania.
Geuther, Frederick Edwin,	*Tinctura nucis vomicæ,*	Pennsylvania.
Greenawalt, David Lehman,	*Examination of lime water,*	Pennsylvania.
Grotz, Milton,	*Success of the American pharmacist,*	Pennsylvania.
Hahn, Edward Titus,	*Hypodermic tablets,*	Pennsylvania.
Hamilton, Walter Scott,	*Guarana,*	Oregon.
Haney, Mary Augusta,	*Disinfectants,*	Maine.
Herbert, Thomas Lewis,	*Aluminum,*	Pennsylvania.
Hering, Edwin Arney,	*Euonymus bark,*	Pennsylvania.
Herrmann, William,	*Acidum aceticum,*	Pennsylvania.
Hetrick, Annie Louise,	*Belladonna,*	Pennsylvania.
Heysham, Horace Besson,	*Aconitum, U.S.P.,*	Pennsylvania.
Hodge, Wm. Roseborough,	*Belladonna,*	Tennessee.
Hollopeter, Arthur Stadiger,	*Urethral suppositories,*	Pennsylvania.
Hoopes, Willmer Preston,	*Saccharum lactis,*	Maryland.
Hoskins, John,	*Saw palmetto,*	Pennsylvania.
Hughes, Harry Bittenbender,	*Liquor calcis,*	Pennsylvania.
Hummel, David Fox,	*Atropa belladonna,*	Pennsylvania.
Hunter, Henry Blount,	*Metallic stearates,*	N. Carolina.
Hyers, Percy,	*Fluid extract of cubeb,*	Ohio.
Jackson, Robert MacGregor,	*Pills and pill excipients,*	Nova Scotia.
Jones, Charles Lyston,	*Glycyrrhiza,*	Delaware.
Kalbach, Charles Peter,	*Incompatibility,*	Pennsylvania.
Kalkman, Henry Alfred,	*Coca and its alkaloid,*	Pennsylvania.
Kauffman, John Wm.,	*Resorcin,*	Pennsylvania.
Kaufman, Reuben M.,	*Pharmacy,*	Pennsylvania.
Kellner, Henry Chas. Fred'k,	*Pharmacy,*	Pennsylvania.
Kelly, Francis Patrick,	*Antiseptics,*	Pennsylvania.
Kercher, Edwin Harry,	*Microscopy,*	Pennsylvania.
King, Albert Joseph,	*Peumus boldus,*	Pennsylvania.
Kline, Harry Herbert,	*Linaria vulgaris,*	Pennsylvania.
Knauer, August Henry,	*Jamaica dogwood,*	Pennsylvania.
Labbé, Edward Blaise,	*Assay of resin podophyllum,*	Oregon.
La Master, Harvey Gillette,	*Camphora,*	Kansas.
Lambert, Herbert Grayson,	*Tablet triturates,*	Virginia.
Lancaster, Brenton Solomon,	*Antitoxin,*	Pennsylvania.
Lanius, Ross McDonald,	*Glycerin suppositories,*	Pennsylvania.
La Rue, Willis Leslie,	*Fluid extracts,*	Pennsylvania.
Lau, Scott Wolford,	*Disinfectants,*	Pennsylvania.

Name.	*Subject.*	*State.*
Lauer, Emanuel Hiram,	*Epiphegus Virginiana,*	Oregon.
Lawton, Henry Cuthbert,	*Vaccine virus,*	Nova Scotia.
Leaman, Davis Hendrix,	*Ipecacuanha,*	Pennsylvania.
Leedom, Morris,	*Ethylenediamine,*	Pennsylvania.
Lehman, Joseph David,	*Hydrastis Canadensis,*	Pennsylvania.
Lewis, Arthur Rimmer,	*Oleum gossypii seminis,*	Texas.
Linn, William Elliott,	*Camphora,*	Pennsylvania
Long, Charles Henry,	*Acetic acid,*	Pennsylvania.
Long, John Grier,	*Benzoin,*	Pennsylvania.
Lorenz, Charles Gustave,	*Fluid extracts and changes,*	Pennsylvania.
Loser, Damon Aloysius,	*Opium,*	Pennsylvania.
Lower, George Grafley,	*Jaborandi,*	Pennsylvania.
Lutz, Walter Preston,	*Heat and cold,*	New Jersey.
McCanna, John Milton,	*Oleum morrhuæ,*	Pennsylvania.
McClosky, Wilson Cathcart,	*Benzinum,*	Pennsylvania.
McFadden, Thos. Francis Jos.,	*Botany,*	Nevada.
McGhee, Saylor John,	*Chocolate,*	Pennsylvania.
McNair, William Righter,	*Vegetable coloring matters,*	Pennsylvania.
Mackenzie, Edwin Golding,	*Permanganate of potash,*	Delaware.
Macphee, Thomas Duncan,	*Peppermint,*	Nova Scotia.
Mader, Elias,	*Taraxacum,*	Pennsylvania.
Manko, Emanuel,	*Asbestos,*	Pennsylvania.
Mathews, William Joseph,	*Sodii boras,*	Pennsylvania.
Mayhew, Charles Holmes,	*Cinchona,*	New Jersey.
Melick, Ralph La Shelle,	*Chemistry,*	Pennsylvania.
Michener, Elmer David,	*Belladonna,*	Pennsylvania.
Miller, Albert T.,	*Tablet triturates,*	Pennsylvania.
Miller, Harper Guiley,	*The metric system,*	Pennsylvania.
Minton, Henry McKee,	*Castor oil,*	Pennsylvania.
Mitchell, Albert Tippett,	*Pharmaceutical assay,*	Pennsylvania.
Moosbrugger, Charles Otto,	*Elder bark,*	Ohio.
Moritz, Birdis Emanuel,	*Ichthyocolla,*	Pennsylvania.
Morris, Max,	*Yucca filamentosa,*	Georgia.
Murphy, Michael Charles,	*Wines,*	Pennsylvania.
Musselman, Morris Myers,	*Poisons and their antidotes,*	Pennsylvania.
Myers, William Henry,	*Patent medicines,*	Pennsylvania.
Naly, Sarah Lusan,	*Microscopical laboratory,*	Pennsylvania.
Nickum, James Weller,	*Anatolian licorice root,*	Utah.
Nugent, Thomas Francis,	*A drug store,*	New York.
Parse, John Merritt,	*Camphora,*	New Jersey.
Pazmiño, Francisco,	*Tinctura Gallæ,*	Ecuador.
Peabody, William Legoria,	*Tannin of cloves,*	Missouri.
Phillips, Oscar Wilson,	*Pyroxylinum,*	Ohio.
Porter, John Morris,	*Incompatibility,*	Pennsylvania.
Porter, William Edgar,	*Cocillana,*	Pennsylvania.
Quick, Benj. Chamberlain,	*Strophanthus hispidus,*	New York.
Rabenau, Arwed Gustav,	*Electrolysis,*	Germany.
Rectenwald, Louis Aloysius,	*Jambul seed,*	Pennsylvania.

Name.	*Subject.*	*State*
Reeser, Richard,	*Oleum ricini,*	Pennsylvania.
Regar, Daniel Schaeffer,	*Theobroma cacao,*	Pennsylvania.
Reich, Solomon Mittler,	*Manna and mannit,*	West Virginia.
Rhoads, Edward Elliott,	*Acetic acid,*	Pennsylvania.
Richardson, Arthur Norris,	*Achillea millefolium,*	Indiana.
Richman, Edward Milton,	*Erythroxylon Coca,*	New Jersey.
Ridenour, William Edward,	*Some chimaphilin derivatives,*	Ohio.
Ridgway, Wm. Frederick,	*Commercial syrup of hydriodic acid,*	Washington.
Ritter, Frederick William,	*Eriodictyon glutinosum,*	Pennsylvania.
Robbins, George Delbert,	*Eugenia caryophyllata,*	Indiana.
Rock, Peter Joseph,	*Cotton plants and derivatives,*	Nebraska.
Roessner, Frank George,	*Preparations of sanguinaria,*	Pennsylvania.
Rossman, George Albert,	*Emulsions,*	Pennsylvania.
Rothwell, Walter,	*Emulsion of cod liver oil,*	Pennsylvania.
Sames, Joseph Howard,	*Cicuta maculata,*	Pennsylvania.
Schmitt, Albert Herman,	*Tasteless fluid extract of cascara sagrada,*	California.
Schrack, Robert Franklin,	*Glycerin,*	Pennsylvania.
Semple, Henry Beidleman,	*Fluid extract of kola,*	Pennsylvania.
Semple, John,	*Education in pharmacy,*	Pennsylvania.
Shimer, Miles Herman,	*Camphora,*	Pennsylvania.
Shoemaker, Clinton Llewellyn,	*Solanum Carolinense L.,*	Pennsylvania.
Simonis, Otto, Jr.,	*Glycerin suppositories,*	Pennsylvania.
Simons, Harry Fisher,	*The pharmacist,*	Pennsylvania.
Skinner, Harry Wharton,	*Cod liver oil,*	Pennsylvania.
Slifer, Leo Engelman,	*Belladonna.*	Pennsylvania.
Smith, Charles Hye,	*Successful pharmacist,*	Delaware.
Smith, Rodney,	*Benzoinum,*	Pennsylvania.
Stengel, Arthur,	*Benzoic acid,*	Pennsylvania.
Stephen, Annie Rex,	*Tinctures,*	Pennsylvania.
Stephen, Walker Lewis,	*The chemist,*	Pennsylvania.
Stern, Charles Wilson,	*Cream of bismuth,*	Delaware.
Strickler, George, Jr.,	*Gum arabic,*	Pennsylvania.
Stuart, Robert Cummins,	*Belladonna,*	Texas.
Swartz, Edward F.,	*Malt,*	Pennsylvania.
Tarr, Robert H.,	*General chemistry,*	Ohio.
Terne, Henry Bruno,	*Animal refuse,*	Pennsylvania.
Terry, John Herman,	*Suppositories,*	Tennessee.
Thayer, Guy Parker,	*Heuchera Americana,*	Ohio.
Thompson, Nathan Lincoln,	*Examination of kola,*	Vermont.
Thornton, Thomas Redman,	*Tannin of cassia,*	Georgia.
Ulmer, Stephen E.,	*Metric system,*	Pennsylvania.
Ulrich, Julius Hirsch,	*Acetic acid as a solvent,*	Illinois.
Unangst, Harvey Edgar,	*Fluid extracts by pressure,*	Pennsylvania.
Van Korb, William,	*Rhubarb,*	New York.
Warfel, Wm. Sylvester,	*Syrupus acidi hydriodici,*	Pennsylvania
Waters, Thomas Carey,	*Analysis of a liquid,*	Pennsylvania.
Watson, Walter Wilmer,	*Anæsthetics,*	Pennsylvania.

Name.	*Subject.*	*State.*
Weaver, Wilmer John,	*Vaccine virus,*	Pennsylvania.
Webb, John Karl,	*Spiritus ætheris nitrosi,*	Mississippi.
Webbert, Harry Sigler,	*Cellulose,*	Pennsylvania.
Weiser, Spencer Bucher,	*Syrup by cold process,*	Pennsylvania.
Welsh, Robert Emmet,	*Pepsin,*	Pennsylvania.
Whiteley, Edward Albert,	*Rhubarb,*	Pennsylvania.
Whitely, John Campbell,	*Incompatibility,*	Ontario.
Whittem, William Henry,	*Glycyrrhiza glabra,*	Pennsylvania.
Wilson, John Swain,	*Precipitates of sanguinaria,*	Pennsylvania.
Winch, Howard George,	*Elixir cinchonæ,*	Pennsylvania.
Winger, David Zwingle,	*Menthol,*	Maryland.
Wolfe, Wm. Holmes,	*Basham's mixture of U.S.P.,*	Maryland.
Woods, Samuel Ross,	*Pharmaceutical education,*	Ontario.
Woolley, Washington Irving,	*Structure of convallaria,*	New Jersey.
Wyatt, John Congle,	*Assay of sanguinaria,*	Oregon.
Yaple, Florence,	*Twelve commercial cocoas,*	Ohio.
Yeakle, Samuel Newton,	*Eucalyptus globulus,*	New Jersey.
Young, George E.,	*Problems for the pharmacist,*	Pennsylvania.
Young, Warren Ray,	*Ipecacuanha,*	Pennsylvania.
Zook, John Noah,	*Syrup of hydriodic acid,*	Pennsylvania

STATES AND COUNTRIES REPRESENTED BY THE GRADUATING CLASS.

Arkansas	1	Mississippi	1	Oregon	4
California	1	Missouri	1	Pennsylvania	125
Delaware	5	Nebraska	1	Syria	1
Ecuador	1	Nevada	1	Tennessee	2
Georgia	3	New Jersey	11	Texas	3
Germany	1	New York	4	Utah	1
Illinois	1	North Carolina	1	Vermont	1
Indiana	2	Nova Scotia	3	Virginia	1
Kansas	1	Ohio	11	Washington	1
Maine	1	Ontario	2	West Virginia	1
Maryland	4				

Special certificates for a two years' course in general applied and analytical chemistry were awarded to:

H. Blount Hunter, North Carolina.

Theodore Littlefield Gamble, Pennsylvania.

William Edward Ridenour, Ohio.

Houston Talbot Thayer, Tennessee.

The following members of the graduating class received the grade of

DISTINGUISHED.

David L. Greenawalt, Percy Hyers, C. Otto Moosbrugger, William L. Peabody, William F. Ridgway.

MERITORIOUS.

Andrew Campbell, Warren W. Flitcraft, Robert M. Jackson, Scott W. Lau, Benjamin C. Quick, Nathan L. Thompson, Robert G. Davis, Walter S. Hamilton, Harry H. Kline, Max Morris, Frederick W. Ritter, Thomas R. Thornton.

The Materia Medica Prize of a microscope, offered by the family of the late Professor Maisch, for original histological work on American plants, was awarded to Frederick W. Ritter, and the following graduates received honorable mention in connection therewith: Edwin A. Hering, Horace B. Heysham.

The Pharmacy Prize, a gold medal, offered by Professor J. P. Remington for original pharmaceutical work, was awarded to Annie R. Stephen.

The Chemistry Prize of an analytical balance, offered by Professor S. P. Sadtler for original chemical work, was awarded to William E. Ridenour, with honorable mention of William L. Peabody and James W. Nickum. The American Journal of Pharmacy Prize of $25, offered by Professor H. Trimble for original chemical work, was awarded to William E. Ridenour.

The John M. Maisch Prize of $20 in gold, offered by Mr. J. H. Redsecker, of Lebanon, Pa., for histological knowledge of drugs, was awarded to Robert M. Jackson, with honorable mention of Frederick W. Ritter, Warren R. Young, Scott W. Lau.

The Operative Pharmacy Prize of $25 in gold, for the best examination in that branch, was awarded to William F. Ridgway, and the following received honorable mention in connection therewith: Frederick Brunhouse, Jr., Henry S. Conrey, William R. Davies, David Ellis, Warren W. Flitcraft, William L. Peabody, John K. Webb, Samuel R. Woods, Washington I. Woolley.

The Theoretical Pharmacy Prize of a balance, offered by Mr. Henry J. Maris for the best examination in that branch, was awarded to David L. Greenawalt, with honorable mention of C. Otto Moosbrugger, Warren W. Flitcraft, Harry B. Foresman, Walter S. Hamilton, Percy Hyers, Robert M. Jackson, Scott W. Lau, Emanuel H. Lauer, Max Morris, William L. Peabody, William F. Ridgway, Frederick W. Ritter, Nathan L. Thompson, Julius H. Ulrich.

The Robinson Prize, a gold medal and certificate, offered by Mr. J. S. Robinson, of Memphis, Tenn., for the best examination in general and analytical chemistry, was awarded to Thomas R. Thornton, with honorable mention of Percy Hyers, C. Otto Moosbrugger, James W. Nickum, William L. Peabody, Nathan L. Thompson, George E. Young.

The valedictory address to the graduating class was delivered by Professor Henry Trimble.

The farewell supper, given by the professors to the graduating class, was held in the Museum of the College, on Tuesday evening, April 16th. The officers and trustees of the College were present, along with some other invited guests. After the menu was disposed of, speeches were made by the faculty, some of the trustees and members of the class.

ALUMNI ASSOCIATION OF THE PHILADELPHIA COLLEGE OF PHARMACY.

The thirty-first annual meeting of the Alumni Association of the Philadelphia College of Pharmacy was held at the College Building, Tenth Street, above Cherry, on Monday afternoon, April 15th.

President William Lincoln Cliffe, Ph.G., presided, and read his annual address, in which he said: "The end of this year begins another era in the history of the Association. Along with the inauguration of three terms of instruction, the Board of Trustees has found it necessary, owing to changes in the curricu-

lum, to place the management of the quizzes directly under its own control, thus abolishing the interest, both financially and supervisory, which the Association has heretofore enjoyed."

William E. Krewson presented his fifteenth annual report as secretary, in which he reviewed the work of the Association during the past year.

"The college review quizzes were quite successful this year," he stated, "221 of the juniors subscribing. The senior quiz class numbered 168 full tickets; 19 did not come up for examination; 188 took first modified examination, and 17 failed to pass the examination; 134 passed successfully; of the latter number 106 will be members of the Class of 1895, and the other 26 are deferred on account of being under 21 years of age, or because they have had less than four years' experience in the drug business, and will be assigned to future graduating classes. During the past year 25 members of former quiz classes who passed the examinations in previous years so successfully, and were deferred, have been duly elected by the Board of Trustees as graduates in pharmacy, and are assigned to the Class of 1895, which will make a total of 169 new members from the Class of 1895. This makes a total of 177 new members added during the past year. The total membership of the association is 2,514; total receipts during the past year, $7,370.57; expenditures, $6,543.75; balance in the treasury, $826.22."

The report of the Memorial Committee showed that 20 members had died during the past year, and the deaths of 5 others not before reported were also announced.

The following officers were elected for the ensuing year:

President, Jacob S. Beetem, '78; First Vice-President, Dr. J. Louis D. Morison, '88; Second Vice-President, Jos. Crawford, '84; Treasurer, Edward C. Jones, '64; Secretary, Wm. E. Krewson, '69; Corresponding Secretary, James C. Perry, '91; Trustee of Sinking Fund, Thos. S. Wiegand, '44. Executive Board, elected for three years: William Lincoln Cliffe, '84; Joseph W. England, '83; Rush P. Marshall, '81; F. W. E. Stedem, '82. Dr. Henry A. Newbold, '70, was elected for two years to fill the unexpired term of Charles B. Hunterson, deceased.

There is a strong sentiment among the members of the Alumni Association favoring the establishment of a gymnasium for the students. The matter of securing a room in the College building for the students for social uses, and the question of publishing a historical compendium of the graduates, were referred to a special committee.

RECEPTION TO THE GRADUATES.

The thirty-first annual reception of the Association to the seventy-fourth graduating class, which was held on the evening of April 15th, at the Hall of the Young Men's Christian Association, Fifteenth and Chestnut Streets, was a very pleasant event.

An interesting concert programme was played by Bastert's Orchestra; President Cliffe made the introductory address; Francis P. Kelly, of Carbondale, Pa., delivered the annual class oration; Brenton S. Lancaster, of Forksville, Pa., recited a poem dedicated to the graduating class; Robert H. Tarr, of Cleveland, O., gave the history of the class of '95, and Charles Wilson Stern, of Smyrna, Del., foretold the future of the class.

Alumni Association gold medal and prize certificates for 1895 awarded to the best student in each branch: Alumni gold medal, William Legoria Peabody, St. Louis, Mo.; pharmacy, David Lehman Greenawalt, Chambersburg, Pa.; chemistry, Percy Hyers, Dayton, Ohio; materia medica, Robert MacGregor Jackson, New Glasgow, N. S.; pharmacognosy, Scott Wolford Lau, Dillsburg, Pa.; general pharmacy, Andrew Campbell, Williamsport, Pa.; operative pharmacy, Wm. Frederick Ridgway, Seattle, Wash.; analytical chemistry, William Van Korb, Amsterdam, N. Y.; microscopical botany, Frederick Wm. Ritter, Middleport, Pa.; prize certificate for best collection of indigenous plants, Clinton Llewellyn Shoemaker, Allentown, Pa.; prize certificate to best junior student, Louis Peter Carstens, Davenport, Ia.

OBITUARY.

Edmond Preston, Jr., Ph.G.

Edmond Preston, Jr., Ph.G., Class of 1884, was born at Fallston, Hartford County, Md., December 6, 1862, and died at his late residence, N. E. corner Broad and Ellsworth Streets, on Tuesday, December 18, 1894, aged 30 years and 18 days. He was the youngest son of Edmond and Phœbe H. Preston, who were members of the Society of Friends. He received his education at his native place and attended the school of Geo. G. Curtis, who was a Harvard graduate. At the age of 17 he entered the drug store of Wm. Proctor, Jr., & Co, at Ninth and Lombard Streets, Philadelphia, as an apprentice and learned the drug business with that firm, serving faithfully for four years. He matriculated at the College October, 1880, and passed a successful examination in the following spring. In the fall of 1882 he entered the senior class, and after taking two senior courses, he graduated with honor in March, 1884, his thesis being entitled "Phytollacca Radix." After his graduation he entered the employ of Howard G. Shinn, Ph.G., corner Fifteenth and Master Streets, remaining for one year, and afterwards he went with Lancaster Thomas, at Nineteenth and Pine Streets, remaining for a few months, when he was transferred to the store Broad and Ellsworth Streets, and was shortly afterwards promoted to the position of chief clerk, remaining until 1890, when he purchased the business from Mr. Thomas, and remained in this location until his death. He was married October 3, 1888, to Lena M. Griest, of Hartford County, Md., who survives him, together with three children. He was an honorable and active business man and an honor to his profession.

His funeral services were largely attended by his fellow-druggists, on Wednesday afternoon, December 19, 1894, and his remains were interred the following day at his native place, Fallston, Md. W. E. K.